QUEENSLAND AGRICULTURAL JOURNAL

VOL. II. AUGUST, 1914. PART 2.

Agriculture.

THE STORY OF A BLIGHT-PROOF POTATO.

HOW THE "NEW ERA" WAS RAISED.

The agricultural paper which recklessly helped to boom even a tithe of the novelties in the vegetable or fruit world which from time to time are introduced to the notice of the farming community would soon be a by-word in the mouth of practical farmers. But on the other hand it is within the province—in fact, becomes the duty of the progressive journal, to draw attention to new varieties of promise, so that those growers desirous of practically proving the merits of such may be able to do so. A fruit or vegetable which may do well in one part of the country may be an absolute failure in another; in fact, both in the growing of varieties, as in manuring, the only certain method for a farmer to follow out is to test these things for himself.

Last month a man from the backblocks—he had never been in Auckland before—walked quietly into the "Farmer" office, carrying a good-sized handbag, and announced that he was the grower of the "New Era" potato—a, so far, blight-proof and frost-resistant variety, to which brief references have been made in this and other papers during the last twelve months. Like so many of those who spend their lives "way out back," and come in closer touch with Nature than do the city dwellers, Mr. J. G. Harris, of Raetihi, the raiser of the "New Era" is a quiet retiring man, who shuns personal publicity. He is, however, a keen student and observer of the Great Dame, and like all those who have during a lengthy experience used their brains as well as their muscles in farming, realises how very limited our knowledge is, and what little

reason any of us have to be dogmatic or over-confident in expressing an opinion on the workings of Nature.

Whether the new potato will prove to be as blight proof and frost resistant in other parts of New Zealand, or in other countries, has yet to be ascertained. Mr. Harris does not guarantee these much-required qualities, but his straightforward account of the tests which the "New Era" has stood at Raetihi for six years, naturally makes one confident that it is a variety worth handling. With the exception of a few tubers sent to a leading English seed house, and an odd sample to the Agricultural Department, this is the first season in which the potato will be distributed. It might be well to mention here that Mr. Harris has for many years made potato growing a hobby, and has made a practice of testing a number of the new varieties as they came out, giving as much as 15s. per lb. for some of them. He is an enthusiastic plant breeder, and fully realised the enormous value of selection, whether applied to either the animal or vegetable world. With his ordinary field crop of potatoes, he only uses seed from specially selected plants, and by this means can always obtain a higher price for his main crops than do other farmers.

HISTORY OF THE NEW VARIETY.

Six years ago Mr. Harris had an acre and a-half in potatoes—two kinds, Eldorado and Northern Star. The crops were grown from his own selected seed, the latter being originally obtained from Messrs. Laird and Co., of Wanganui, and the former from Mr. Atkinson, of Fielding. That present-day curse of the potato grower—blight—came along, and swept the crop with the exception of one plant, which, with a very strong and upright habit of growth, was untouched. Mr. Harris's attention was naturally drawn to this plant, and he carefully kept the six rather ugly-shaped tubers which it produced. Next season he planted these, but only two grew. They were planted out amongst a crop of two acres, but the season was a good one as no blight made its appearance, Mr. Harris was unable to gain any further knowledge as to the resistant qualities of the new arrival.

At the commencement of the third season there was much talk of the improved Up-to-Date potato, and Mr. Harris bought enough seed to plant half an acre. The forty to fifty tubers of the new variety, the product of the two roots mentioned, were planted out through the crop. The blight came, however, and totally destroyed the crop of Up-to-Dates; in fact, so severe were the effects of the blight that not a single root was dug, while the plants of the new variety were absolutely untouched although surrounded by the blight-stricken crop, and yielded at the rate of 10-12 tons to the acre.

In the fourth year the plantings of the "New Era" tubers, as Mr. Harris had named the new variety, were made right across a half-acre paddock with the main crop of Northern Stars planted down each side. It was not a good season and just before the Stars became ripe a severe frost was experienced which cut them down but did not touch the "New Eras," although planted in the same paddock and under exactly similar conditions. Mr. Harris's brother, who is a resident in the Manawatu,

happened to be staying the night with him, and after going outside the morning following the frost, came in and said, "Well, Jack, your potatoes are frost-proof as well as blight-proof."

Up to the fifth season Mr. Harris had said little about the new variety, for he wished to thoroughly test its powers of resistance to both frost and blight. During March there was a bad spell of muggy weather and blight again injured the crop of Northern Stars, but left the rows of "New Eras" uninjured, and Mr. Bayliss, the Fields Officer of the Agricultural Department, who visited Mr. Harris's farm during the autumn, pulled up dozens of roots without discovering a sign of blight, although the blighted leaves and haulms of the Northern Stars were falling on the "New Eras."

The present season, the sixth year, provided further evidence of the power of the new variety to resist blight. Mr. Harris had again two acres in potatoes, comprising such varieties as Northern Stars, Up-to-Dates, Irish Rocks, Eldorados, and a few Gamekeepers. Late in the season, in April, blight made its appearance and attacked all the varieties named except the "New Eras."

By the above it will be seen that the new variety was found six years ago and that for the following five years its blight and frost resistant qualities were tested in a very thorough manner, so that the owner is justified in placing it on the market. During the last twelve months numerous letters from all parts of the world have been received at the office of this paper relative to the new variety, and for the information of our readers we are glad to be able to place before them an authentic account of the production of this potato. The whole world is looking for a blight-proof potato, and the searching tests which the "New Era" has been subjected to by the raiser would make it appear that a certain measure of success at least has been obtained.

Yield and Quality.

The "New Era" is a nicely shaped potato, bearing some resemblance in form to Eldorado. It grows on a strong, thick stalk, and is not inclined to sprout very freely.

This year on Mr. Harris's farm at Raetihi it yielded two bags to one of the Northern Star, and when picked before ripening has a remarkably clean skin, thus making it suitable to grow for the early potato trade. It appears also to be a good keeper. During the fourth year Mr. Harris sent nine sets to one of his brothers, who lives in a district 1,000 ft. lower that Raetihi, and here the potato gave equally good results, the nine sets yielding 56 lb. of eatable potatoes.

In conclusion, it might be well to issue a word of warning in regard to the reproduction of any new variety of potato, more particularly when its blight-resistant powers are its attraction. Every care should be taken not to sacrifice its "constitution"—if such a term can be used to a potato—to speedy reproduction. Several varieties of potatoes which came out to this country with a good character in regard to their blight-resistant qualities were speedily run out in the feverish efforts of the

introducers to reproduce them in the shortest possible time.—"New Zealand Farmer."

[It is stated that this potato has produced up to 20 tons per acre. An advertisement in the "New Zealand Farmer" gives the price of seed of the "New Era" as 7s. 6d. per lb.—Ed. "Q.A.J."]

PRICKLY PEAR BURNERS.

The question of the destruction of prickly pear is one of vital importance both to the State and to the individual settler—pastoralist or agricultural selector. Many have been the suggestions for means of effectually dealing with this pest, which is annually making large encroachments on the finest grazing and agricultural lands on earth. Many schemes have been placed before the Government, but so far none have proved efficacious, or, if efficacious, they have involved too great expense for effecting the desired result. Mr. Roberts's experiments seem to be likely to come to fruition, and it is devoutly hoped that his process of destruction of the pear by enveloping it in a poisonous gas will prove not only a success as to the destruction of the pear, but also from a financial point of view.

We have now another enemy of the pear in the field, Mr. Dawson, who has been all through the pear country, and who proposes to completely destroy the plants by means of burning. This burning does not mean the reduction of the pear to ashes, resulting in the production of potash available for agricultural purposes, but it aims at completely destroying the prickles, and *pari passu,* the seeds in the ripe and unripe fruit, together with the roots, but leaving the scorched leaves in such a condition as to be readily eaten by stock.

It is, perhaps, not generally known, but we are authoritatively informed that, whilst the unripe fruit falling on the soil allows the seeds to germinate, the seed of the fully ripe fruit invariably fails to germinate. One pastoralist interested in the question offered, we are informed, £5 to anyone who could raise plants from the seed of a fully ripened fruit. This meant, of course, that the fruit must not first be swallowed by an emu or other prickly pear feeding animal. Like the Moreton Bay fig and many other plants, the seed does not freely germinate unless it has been in contact with the gastric juices of these animals' stomachs.

Now, to come to Mr. Dawson's scheme for the complete destruction of the pest by means of burning, we will, in general support of it, show what has been done in the same manner in the United States of America.

In 1905 the United States Department of Agriculture published a very interesting Bulletin (No. 74) of the Bureau of Plant Industry, by D. Griffiths, Assistant Agrostologist in Charge of Range Investigations.

In this Bulletin, Mr. Griffiths deals with pear burners. These were first manufactured in 1898. As now used they are essentially a modification of the plumber's torch. The two pear burners on the market are

very similar in construction, and are both efficient machines according to the best evidence it has been possible to obtain. They consist essentially of a strong, well-riveted metal tank, which, in actual use, is supported on the shoulders of the operator by a strap; a long delivery pipe, and a burner for generating and consuming gas from gasoline. The two machines differ only in minor mechanical contrivances and in the form of the burner. It has been found by experience that it is absolutely essential that the tank be strongly built in order to prevent accident. Several of the first burners used were too light in construction and caused serious accidents. It is said that one or two men were killed by the explosion of the tanks and the burning of the gasoline.

The distinguishing features of one of the pear burners on the market are the turning joints of the delivery pipe, and the simple coiled-pipe burner, which is covered with a sheet-iron cylinder to prevent escape of heat, to give direction to the flame, and to protect the burner in windy weather. The other style of burner differs from the one just described mainly in the burner, which is somewhat more complicated. Both machines require gasoline for their operation. Practically, no labour is necessary with the burners other than that of passing the blast flame from the torch over the surface of the joints momentarily. Indeed, it is not usually necessary to do this with over two-thirds of the plant, for there is commonly enough dead herbage at the base, and growing up through the pear plants, to assist in burning off at least one-half of the spines. Besides, the spines are commonly less numerous upon the old stems, and cattle experience but little difficulty in eating the remainder after the outer two to four joints have been freed of them. The process of singeing the joints with one of these machines is therefore not a laborious or expensive one. Indeed, it is by far the cheapest method yet devised for utilising the prickly pear. It has, however, one or two disadvantages which will be discussed later.

Cattle brought up in pear pastures do not have to be taught to eat pear. They take to the feed very naturally. After a day or two of feeding, the sound of the pear burners, or the sight of smoke when pear is burned with brush, brings the whole herd to the spot immediately, and they follow the operator closely all day long, grazing the pear to the ground—old woody stems and all—if the supply that the operator can furnish is short.

The above short résumé of the method of destruction of the pear plant in the States will show that the burning of the plant does not mean its total destruction, which Mr. Griffiths says "would be a calamity." But what is needed in Queensland, with the enormous area of rich land which would carry thousands of sheep or cattle overrun with the pear, is its absolute destruction, and that is what Mr. Roberts and Mr. Dawson propose to do. We do not require the pear for stock feed. Get rid of the pear, and its place will be taken by succulent grasses and herbs which have ever been the stand by of the big pastoralist and the grazing farmer. We sincerely trust that both these gentlemen will be successful in their undertaking.

As far as feeding stock on singed pear is concerned, Mr. Griffiths points out that no manner of feeding cactus yet devised, without greater care than the feeder is willing to bestow upon the work, does away entirely with the evil effect of the spines. Singeing with a torch or brush is the most effectual in this regard, if sufficient care is taken by the operator. In practice, however, very little attention is paid to the small spines, the effort being to burn off the distal three-fourths of the large ones, leaving most of the small ones for the stock to contend with. Indeed, there is a prejudice—whether well founded or not, it has been impossible to determine—against pear scorched to the extent necessary to insure the removal of all the small spines. It is claimed that cattle scour much worse upon pear which has been excessively scorched by either torch or brush flame.

Another objection urged is that torch-scorched pear invariably dies if the flame is kept upon it long enough to ensure the removal of all the spines. . . . Simply singeing off the larger spines does not check the growth of the plants at all, and all the singed plants not actually grazed down grow in the following season.

In conversation with Mr. Dawson, we learned that by his burning process, the plant, the roots, and the seed, are absolutely destroyed. In very heavy pear growing amongst timber, he claims to be able to drive the fire-blast with devastating effect to a distance of over 6 or 8 ft. into the densest growth. Thus, by working on the outside edges of the growth, he will be enabled to follow it up by complete destruction of pear amongst timber.

CULTIVATION OF THE POTATO.

In view of the enthusiastic manner in which the generous offer of Mr. W. J. Brett, manager for Messrs. Denham Bros., to supply a certain quantity of seed potatoes to State schools for planting and growing exclusively by boys, has been taken up, we give, for the benefit of those who have, perhaps, not had the opportunity of studying the practical methods of potato culture, the following notes on the subject, by an officer of the Department of Agriculture and Stock:—

The best soil for successful potato-growing is one which shows the greatest content of potash as shown by chemical analysis of the tuber. Hence the well-known value of soil derived from granitic detritus. In such a soil there is abundance of potassium silicate, derived from the decomposing felspar, and slowly set free in other forms for the uses of the plant. Where ground has been annually cropped with potatoes for many years without a rotation, it is mainly owing to the potash having been used up that the soil is not liberal in its return of tubers.

Deep, friable, well-drained alluvial loams rich in organic matter, and capable of absorbing and retaining moisture, form ideal soil, provided they are situated in a suitable and sufficiently moist climate. Forest and scrub soils approaching this physical condition, and naturally enriched by potash from the burning-off of timber, are also good for potato production. The growth and development of tubers demand a

loose soil. Heavy soils, which crack readily or set hard, are unfavourable. Wet, sour, and clay soils should be avoided, as they have a tendency to produce waxy potatoes of poor quality. Sandy soils lacking organic matter are not suitable for continuous production. As a general rule, fertile loams, virgin soils, properly prepared, give the best results.

Preparation of the Soil.—While the successful raising of marketable potato crops is dependent largely on the character of the land and the season experienced, the chief factor lies in its proper preparation.

Hurriedly prepared fields are only courting a partial failure or serious reduction in yield. Generally speaking, the heaviest falls of rain come in the latter end of summer, and the winter months are inclined to show averages slightly below normal. Assuming that it is intended to take advantage also of the mellowing and sweetening influences of frost and plant immediately it is safe after the winter, it is imperative that on virgin soils, apart from scrub land, the work of preparation should extend over several months. Operations should be directed in accordance with varying local conditions, but it remains that certain fixed objects must be kept in view—the primary one being tilth, and the secondary a retention of moisture for the approaching planting season and the development of the crop. Any encroachment of weeds or grass on the "fallowing" land will have as its corollary an unsatisfactory condition for all subsequent operations, and, if fouled in this way, the work of the potato-digger is very much hampered.

Cultivate deeply and in accordance with the nature of the soil. On virgin land shallow "breaking up"—say, in October or early November—with an English type mould-board plough to invert the furrow slice, is commended. Should couch be present, the surface must be worked consistently during the hot weather with the disc and tine harrows to give all the exposure possible to dry it out. If otherwise, roll after the plough, and harrow to fill the interstices between the furrows.

Use the disc harrows just previous to cross ploughing, which should be carried out as soon as grass has rotted down sufficiently, and to a depth of not less than 6 in., which should be increased gradually in the seasons following.

It is inadvisable to create a fine surface tilth at this stage, as if tropical rains are experienced much soil washing takes place. Any inclination to surface crusting will require the early use of the tine or spring toothed cultivator, which will serve also to keep the land clean.

The ground having thus been properly prepared, the earlier the spring crop can be put in the better will be the chances of a heavy return. Where there is little danger of late frosts occurring, planting may begin at the end of August, but in low, frosty districts, planting should be deferred until there is little likelihood of the young plants being injured by frost. If planted late at this season, the crop may strike wet weather and have a tendency to produce an over-abundance of haulms and a small amount of tubers.

Selection and Condition of Seed.—No matter how well the land has been prepared, if the sets are inferior in quality, a full return cannot be

expected; the selection of suitable seed, apart from variety, has an important bearing upon the success of a crop.

Select from a variety true to type, well grown, uniform in character, and having a clean skin and free from disease (see specific for the disinfection of seed potatoes under the heading of "Diseases" in the pamphlet on the Potato issued by the Department of Agriculture and Stock); flesh should be firm to the touch, but yielding slightly under pressure.

The eyes require to be almost level with the surface in most varieties, and particular attention directed to the condition of the buds or young shoots. Sets in a condition to plant should have short robust sprouts; those showing a long or attenuated growth are to be avoided.

Storage in large heaps and a lack in turning the potatoes encourage this condition. Shallow layers are to be preferred, with frequent turning, and the picking out of any showing traces of rotting.

The sets for planting are either tubers too small for table use—but graded from a good crop—or those of ordinary commercial size and which have to be cut into sections.

It is generally recognised that, for conditions prevailing over most of the State, whole sets are preferable. Exceptions are to be considered in the event of a possibility of the introduction of disease, when an additional precaution may be taken by cutting, when detection is easier.

For the autumn planting, whole seed is certainly to be recommended. The reason for this lies in the fact that, if wet conditions follow after the planting of cut sets, accompanied by warm weather, the planting may be lost by rotting.

The safest season for "cut" seed is for the August or spring planting, when the soil is colder and generally not so moist.

If whole sets be used, care should be taken to procure from a reliable grower or reputable seed firm.

Very small whole potatoes are not likely to give the same results as a more robust sample about 2 in. in diameter. This latter carries a store of nourishment for the young plant, tides it over a dry time, and gives it an earlier start.

For cut seed, moderately sized tubers are to be preferred; nothing is to be gained by making small sets for reasons similar to above, and they are relatively more subject to rot.

Number of Eyes to Set.—Much importance is often placed as to the number of eyes that should be set, but this is of much less value than the size of set. Where several eyes may inadvertently be left on a cut set and these start simultaneously into life, or when whole potatoes are used and planted at a seasonable time, the primary shoot assumes control and gives rise generally to one stem. Exceptions occur in backward seed or if planted late in the spring, and when humid weather is experienced; then considerable suckering takes place.

Cutting Seed.—As to the best method of cutting the tuber into sets, it will be observed that at one end of the potato, in most varieties, there is a bunch of eyes called "the crown." In the case of the smaller-sized

potatoes all that is necessary is to cut them in half lengthways and right through the centre of crown, leaving about an equal number of eyes on each side.

With larger-sized potatoes the first cut should be made across its length and about one-third from the end opposite the crown; this "stem" end forms a set; whilst the other section is cut through the centre of crown at right angles to the first cut, making three sets in all.

Extra large potatoes should be cut evenly into four pieces with a regular cut lengthways as before noted, and then crossways or else into pieces containing from two to three eyes and weighing about 2½ oz. each. A thin knife is preferable, and should pass more freely through a seed potato than a crisp table one.

Time to Cut.—This should be done a day previous to planting to allow the raw surface to heal up; a sprinkling of wood ashes or slaked lime is advisable.

Sprouting Seed.—Mention has been made previously as to the difficulty of maintaining supplies of seed for the two plantings—July-August and in February—obtainable during the twelve months in this State, necessitating an importation for one planting, as the time between the harvesting of one crop and the planting of the next is so short. Changes of seed from a cooler climate are thus assured, as, if otherwise and an attempt was made to carry on with an early maturing variety, its vitality is soon irredeemably impaired. It is possible to make use of a quick-maturing variety to provide seed for a succeeding planting, provided it is put in early and harvested as soon as "ripe," and then shortly afterwards spreading out the potatoes in a shed or barn in shallow layers to dry thoroughly. Exposure to strong light will turn the colour of skins to a greenish hue, and the process will assist in prolonging their keeping qualities even when planted again.

If bagged subsequently, they will sprout much earlier than if kept in a large heap in a shed, which if moist will have a tendency to cause decay in the potatoes, and when they do sprout the shoots will be nothing like as robust as the treated seed.

Stored potatoes require to be frequently turned and picked over to take out decaying tubers.

Amount of Seed per Acre.—This will vary and depend on the class and size of sets. Usually 7 cwt. to the acre may be taken as an average.

Planting.—It is generally recognised that the earlier the spring crop can be put in, the better the chances of a heavy return, assuming, of course, that conditions are favourable. A late crop, or an unseasonable variety planted at this season, may strike humid weather and have a tendency to produce an over-abundance of haulms and a minimum amount of tubers.

For the autumn crop, the time is regulated by being put in sufficiently early to allow the tubers to grow and mature before the advent of frost. Whether the crop is to be planted on the flat or ridge will depend largely on the soil and environment. In dry localities, planting and subsequent working should be kept on the flat; the potatoes

being planted every 15 in., and at a depth of approximately 4 in., immediately after the plough, and in every third or fourth furrow, according to the width being cut, so as to bring the rows from 32 to 36 in. apart, and allow for horse cultivation. When ploughed in, whether with disc or other type, it is preferable to plant on the side of the furrow rather than the bottom, to prevent trampling of seed potatoes by horses. For ridge planting, the double mould-board hilling type of plough is to be preferred, but the single plough may be used; in any case the furrows should be planted up and filled in as quickly as possible after opening. Care should be taken in setting the hilling plough so that it will leave a hollow rather than a pointed crown. In the event of the use of fertilisers, reference should be made to the previous notes governing their application.

When opening furrows, undue exposure should be avoided and the planting and covering in arranged simultaneously; three good planters will keep one plough going. Machines may be used with advantage where large areas are planted; these are designed to complete the opening, the planting, and covering in at one operation.

After Cultivation.—The first cultivation should be given just after the young plants show up through the ground. Light lever harrows, with the tines set back from the perpendicular, are to be recommended.

A pair of light home-made harrows, useful for any class of work where "hills" are put up, can be made in a half-moon shape with short tines; these overcome the damage often associated with heavy and flat harrows which do not possess the adjustable tines.

Scuffling between the rows is most important, the ordinary Planet Junior type of machine being used, at least twice. The manner in which the ground has been worked will determine how the tines should be adjusted, so that the earth may be moulded in as desired towards the plants at each cultivation, taking care not to stir too closely or too deeply to disturb the roots.

Where hilling is practised, a special mould-board type of sweep can be attached to the machine for the purpose of combining the two operations at the time of the last stroke of the scuffler. The moulding over of friable soil is important in relation to protecting the tubers from the attack of the potato moth, also to prevent discoloration of potatoes which may be exposed to sunlight, and, if in cold districts where an autumn crop is obtainable, a protection of this character helps to save the potatoes from severe frost bite, if they have to remain any length of time before lifting.

Hilling up with the double-mould plough is advisable in damp positions and in situations where this class of work is required; and it is equally as important to give the ridges plenty of body and not bring them to a point.

No further horse cultivation is required between the rows after earthing up.

Harvesting.—To anticipate a harvest is to take reasonable precautions other than careful cultural operations to get one, by paying attention to directions laid down, as preventive measures against blight, and the various troubles incidental to potato-growing.

When the crop is sufficiently ripe, this is generally ascertained by the dying down of the haulms, also by the condition of the skin of the potatoes, which should be fairly dry and set, and not readily peeled off.

Early frosts will often hasten the harvesting of the autumn crop, but in the case of the summer-ripening crop, growth is prolonged, and careful observation is necessary to determine how soon they can be lifted, as the hot weather, and at times the potato moth, make it expedient to harvest as soon as ready. Another reason is that some varieties have a predilection to a second growth.

The means adopted in the harvesting of the crop are many.

The flat-pronged digging fork is still in vogue, but where large fields have to be dealt with it is too slow and expensive, contract prices running from 1s. to 1s. 3d. a bag, and in some cases up to 1s. 6d.

An ordinary single-furrow plough acts fairly well, provided the ground is worked in lands, the side of the furrows on one side of the hill being trimmed off first before ploughing the potatoes out for the "pickers."

A double mould-board plough with a specially shaped pronged share is used largely in some localities, the potatoes being left on the surface after it.

If the ground becomes fouled with weeds or grass, the disc plough may be used, and it is in such situations that a potato-digger cannot operate to any advantage.

Potato-diggers are to be recommended when they can be used on friable soil free from rubbish. Many classes are on the market, some being designed for grading the crop; but, like most machines, they cannot accommodate themselves to all conditions.

Suitable weather and other conditions are to be looked for when harvesting; the soil should be sufficiently dry so as not to stick to the tubers, and they should on no account be left lying exposed to the hot sun or to strong winds, which have a damaging effect on their keeping qualities.

Grading.—No grower can afford to neglect this most important feature. The vagaries of the market may at times shatter the good intentions of those who carefully class their products, but it is well known that the law of averages does not apply to a line of mixed-sized potatoes, and a depreciated price has to be accepted when the smaller and unmarketable stuff is included with that of better quality.

With a partly perishable product, there is usually little inducement to hold over for a rise, particularly with the summer crop when the wet season is at hand; and there is, moreover, always a fair and sometimes a heavy percentage of unmarketable potatoes after storing, as well as the extra cost entailed in picking over to be considered.

Potatoes of a regular and uniform size are preferred by the large consumer. The grower who can arrange his grading by a machine or with the "pickers up," in the field, does so to his own advantage.

Once in the barn, under cover, sorting-machines certainly facilitate this work; and, if a grower is specialising in seed potatoes, there is some

justification in rehandling the "smalls," to cater for the "seed" trade with an even selection of the first grade, and brand up his marketable stuff with his own name or trade mark.

A recommendation has been made that when potatoes are stored they should be kept in thin layers, a dry airy place being preferred. There is little gained in neglecting to protect the open bags of potatoes in the field, as it is here that infestation may readily take place by the potato moth, owing to a practice (which is to be deprecated) of covering the open bags with a bundle of potato haulms.

The Varieties to Grow.—Several references have been made to the seasons and conditions governing the supply of seed potatoes to suit this State's varied requirements.

To recommend varieties—let them be early, medium, or late—is to conjure up the fact that our climatic conditions preclude the chance of a grower arranging a continuity in the production of one or more kinds where there are two distinct seasons in the year, unless fresh seed is brought in once a year from a cooler climate. The Stanthorpe district climate resembles more than any other that of New England, for instance, and it is quite possible to use seed from an early maturing crop planted there in October, harvest it in March, and hold over for the August planting in warmer localities instead of importing seed. But, although potatoes do remarkably well in some picked spots, the Stanthorpe district (from the nature of its soils) is unlikely to produce, for some time at least, anything approaching a percentage of the seed potatoes required in more favoured potato-growing localities. Varieties regarded as standard procurable types on the market are as follows:—

Early kinds—Early Rose, Early Vermont, Bliss Triumph.
Medium—Brownell's Beauty, Satisfaction, Up to Date.
Late—Circular Heads, Guyra Blues.

Irrigation.—The potato is not a plant whose growth it is advisable to force. Should the land be dry at the planting season, and both the conditions and water be suitable for irrigation purposes, water may then be applied with advantage by well soaking the drills. After allowing a day or sufficient time to elapse, readily observed by noting the condition of the soil, planting may be proceeded with in the ordinary way.

A second watering, if necessary, may be given between the rows at a period when the young potatoes begin to form, but not later than this. After any form of irrigation, the breaking up of the crust or covering in, in the case of furrows, should be consistently adhered to.

Manuring for Potatoes.—Where manure is required on the land, it should be remembered that artificial or farmyard manures will not invariably produce the same result on different soils. The rich black and red soils of the Darling Downs, for instance, contain certain constituents which are wanting in the lighter Western or coast soils. In some, there is already a sufficiency of phosphoric acid; consequently an application of superphosphate might prove injurious. Where cultivation grounds are deficient, as most of them are, in phosphoric acid, it becomes necessary, in order to obtain a better crop, to secure support in the

form of an easily soluble phosphoric acid. Bonedust is a phosphoric acid manure which gives this result; but superphosphates produce better and quicker results.

For potatoes, a fertiliser rich in potash is essential. For general purposes a good mixed fertiliser for this crop should consist of—Available phosphoric acid, 7 per cent.; potash, 11 per cent.; nitrogen, 3 per cent.; 700 lb. to the acre.

Sulphate of potash is mostly employed as a source of potash for potatoes. Muriate of potash is said to give even better results than the former.

Dried blood contains, on an average, 11 to 13 per cent. of nitrogen, but it is less soluble than sulphate of ammonia and nitrate of soda. Manures containing sulphate of ammonia should not be mixed with lime, nor applied to land which has been recently limed.

The value of kainit lies in its potash, of which it contains 12 per cent. It is the cheapest of the potash manures.

Following are the results of some experiments carried out by Mr. H. C. Quodling, Inspector of Agriculture, when manager of Westbrook State Farm. The manures used were—

Superphosphate, at the rate of 4 cwt. per acre.

Bonedust, at the rate of 4cwt. per acre.

Blood, at the rate of 4 cwt. per acre.

Kainit, at the rate of 4 cwt. per acre.

One plot was unmanured, and planted with cut potatoes, and in the last plot, also unmanured, the potatoes were planted whole.

Manure.	Rate per Acre.	Weight of Seed Planted.	Cut or Uncut.	Yield per Plot.	Area of Plot.
	Cwt.	Lb.		Lb.	Acre.
Superphosphate	4	178	Cut	716	¼
Bonedust	4	178	,, ...	704	¼
Blood	4	178	,, ...	712	¼
Kainit...	4	178	,, ...	722	¼
Unmanured	...	178	,, ...	751	¼
Unmanured	...	178	Uncut ...	708	¼

The best manure then, for potatoes, is a mixture of farmyard manure and some artificial. For instance, 16 tons of stable manure per acre will produce a larger crop than the most remunerative dressing of artificial manure; but, employ a mixture of 8 tons of stable manure and 3 cwt. of nitrate of soda, or an equivalent quantity of sulphate of ammonia, and a far greater yield will be obtained—in fact, such a dressing gives the greatest yield and the most remunerative results of any. If stable manure is unavailable, any artificial dressing for potatoes should contain nitrogen, phosphorus, and potash. Omit one of these (as has already been shown), and the result will be a poor crop. The omission of nitrogen will cause the greatest loss, and that of potash the least.

THE CONSERVATION OF GRAIN.

At a recent meeting of the National Agricultural Society of New Caledonia, a communication was received from Mr. Lang, Government Veterinary Surgeon at Noumea, on an efficacious method of conserving maize and other fodder grain.

Seed of maize imported into Noumea rapidly became blackened and infested with weevils. Mr. Lang has sought a practical method of delaying, if not entirely preventing, the production of these corrupting factors, in order to utilise the grain.

Heat and humidity being the two indispensable conditons for the development of mouldiness, it appeared to be only necessary to suppress one of them—for preference, the latter—to attain the desired result. Being aware of the absorbent power of lime, Mr. Lang submitted the grain to the action of this substance. All the sheet-iron walls of a barn were white-washed to a height of about 6 ft., and in the four corners he placed four buckets of quicklime.

The lime absorbed the humidity, and notwithstanding the surrounding heat the vitality of the parasites was destroyed. Singular to say, the peculiar mouldy smell quickly disappeared, and the grain was restored to its natural bright colour. Three months after being placed in the magazine 32 tons of maize presented the appearance of perfect grain after four applications.

When replacing the lime as soon as it appeared to have lost its absorbent power, Mr. Lang, for treating 62 tons of maize, used ten kegs of quicklime, at an expense of about 1 franc (10d.) per ton. Thus, at small cost, farmers could preserve their maize grain for two months.—"Bulletin de l'Office du Gouvernement Général de l'Algerie."

QUEENSLAND COTTON IN ENGLAND.

In December last the Agricultural Department sent to England five samples of Queensland-grown cotton to the Dominions Royal Commission, to be valued from a commercial standpoint, in order to obtain some idea as to the prices that could be secured for Queensland cotton on the European market. The Department has received, through the Agent-General, a reply from the British Cotton Growing Association, Manchester, as follows:—

Allen's Improved Long-stapled Upland Cotton, grown at Gossypium Park, Cairns (No. 1 sample), classified as dull; staple, fine, but very irregular in length, and rather weak; value, 8d. Long-stapled Upland Cotton, Nyassaland variety, grown in the Hughenden district, classified as dull; staple, $1\frac{3}{8}$ in., mixed with short, rather weak; value, 8d. Upland Cotton in Lint, grown in the Hughenden district, classified as good colour; "f.g. middling" in grade, $1\frac{1}{8}$ in., fairly strong, good result; value, 8·30d. Upland Cotton in Lint, grown in the Miles district, classified as "f.g. middling"; staple, about 1 in., fairly strong, rather poor result; value, 8d. Cotton, Caravonica Lint, classified as fair colour;

staple $1\frac{3}{16}$ in. and 1¼ in., moderately rough; value, 8½d. and 8¾d. Allen's Improved Long-stapled Upland Cotton, grown at Gossypium Park, Cairns (No. 2 sample), classified as dull; staple, fine, but soft and weak; staple, 1⅛ in., very irregular, poor result; value, 7·80d. Long-stapled Upland Cotton, Nyassaland variety, grown at Gossypium Park, Cairns, classified as dull, rather discoloured; staple, 1⅛ in., soft and weak; value, 7·80d. Caravonica Upland, grown at Gossypium Park, Cairns, classified as little stained, dull; staple, 1¼ in., rather mixed with short fibre, fair result; value, 9d. Caravonica Silk, grown at Gossypium Park, Cairns, classified as slightly stained; staple, about 1¼ in., moderately fine; value, 8·75d. The value of Middling American Cotton at date of valuation was 7·20d. The valuations are based on the assumption that the bulk would be equal to sample, and also for a commercial quantity of not less than 1 ton of lint in each case.

SHADE TREES.

The late Mr. L. A. Bernays, who was a most enthusiastic and scientific botanist and gardener, always maintained that in tropical and sub-tropical countries the planting of shade trees in the streets is an absolute necessity. "In a country like Queensland," he said, "when the days of sunshine are so much in excess of those of cloud, and the rays of the sun for many months of the year are so fierce, the subject of planting for shade purposes is one of much interest, and of no slight importance to the comfort and health of the inhabitants of all classes." It is curious enough, however, that the amount of tree-planting for this purpose which has been hitherto done is infinitesimally small, and that public interest shows little sign of turning towards the subject. In the very few cases in which attempts have been made at planting shade trees, they have originated with the taste and fancy of some one member of the governing body of the locality, and have not been the result of any public demand on the part of those most concerned. In this respect Queensland is far behind the other Australian States. From the above observations, however, the cities of Rockhampton, Maryborough, and Toowoomba must be excepted.

In Toowoomba especially, whole streets have been planted with fine shade trees on both sides, generally well selected, and planting is still going on. Very little has been done in the metropolis, and where trees have been planted in the past, as in Roma street and on the North Quay, with few exceptions the selection was bad, especially in the former locality. There is practically virgin ground for the efforts of some patriotic and far-seeing councillor to move his colleagues in an object of such deep concern to the ratepayers.

It must, however, in justice be remarked that there is no doubt that to the short-sighted narrowness of our principal streets is, in some degree, due the absence of shade trees; but as that reason does not apply to many miles of streets in which there is ample room, the real reason must be looked for, not so much in the narrowness of the streets as in

that of the minds of past selected representatives of the payers of local taxes. Possibly aldermen of the earlier days regarded the matter from the eminently utilitarian point of view of the Dutch councillor of an American town, who, upon being remonstrated with upon his persistent refusal to vote money for street-planting, replied, "Ef anypody want trees, let 'em moof in de country—I don't want no trees in de sid-walks!"

Mr. Bernays goes on to rate the city fathers of his day: "It is bad enough when local bodies fail to do their duty to provide the shade of trees to the hot and dusty citizen as he plods from place to place in the prosecution of his business under the rays of a vertical sun; but what can be said of the vandalism which destroys handsome and umbrageous trees, the growth of half a century or more, for the fancied reason that they obstruct the side-walk. Surely the shade, the healthiness, and the beauty of such trees may be regarded as amply compensating for the trouble of here and there having to take a step to one side. And yet this has been repeatedly done in Brisbane by men with no more sense of the beautiful than has a carpenter's rule, or a spirit-level."

At Ballarat, in Victoria, there were, as far back as 1883, no less than thirty miles of streets planted with between 5,000 and 6,000 trees, the whole being the work of the municipal authorities, some of the avenues, from their length and the handsome growth of the trees composing them, affording splendid scenic effects. The cost of planting these, including the guard, was 15s. per tree, to which must be added the cost of raising the trees, which is done in a public nursery maintained by the corporation.

Going further afield, among English-speaking communities, we find in the United States that the creation and maintenance of plantations and the planting of trees is regarded not only as an important but as an essential function of municipal bodies. So largely is tree-planting carried out in the States that, in one case, and it is probably only one of many, that of Newhaven, the number and grandeur of the trees with which it has been planted has earned for it the designation of "The City of the Elms."

Brisbane, of course, is not New York, but we have a right to expect as much enlightenment here as there.

"No one, even the most ignorant," says an American writer, "can doubt that trees add to the charms of a location. In summer time they protect it from the scorching rays of the sun, and provide pleasant and cool retreats from the heat; and in winter are of no small value in protecting our houses from the cold and piercing blasts which then prevail. Trees around a house impart a homelike and attractive appearance, and yet how few of all the houses which are built are adorned and protected by trees. The influence of homes so surrounded must be felt; and at the close of the day, when the work is done, trees present an irresistible attraction to draw families together to sit under their shade, and so exercise an undoubted influence over the mind."

If this be true in a country like the United States, how much more forcibly much of it applies to a semi-tropical country where the sun is almost always shining. The objection which obtains in temperate

climates, that trees in streets and about houses generate damp, and encourage mud, does not apply here. Again, if the remarks of that enlightened American are true as of streets and dwellings, how much more forcibly do they apply to the hundreds of our State Schools, many of which still stand in the midst of arid, treeless enclosures in which children at play are exposed to the pitiless rays of our fierce summer sun unless they confine their games to a playshed. This matter has, however, for some time been attended to, and the institution of Arbor Day has resulted in scores of schools, both in towns and in the country, being surrounded by well-selected shade trees. The writer can well recollect when, in the sixties, he was an assistant teacher in the South Brisbane Primary School the misery he endured when superintending boys and girls in a gravelly playground in the height of summer, in the pitiless sun, without a particle of shade anywhere.

The utility, the beauty, and the success of trees planted for shade purposes depends largely on the selection of species. This must depend upon the varying conditions of location, climate, soil, rainfall, area, and proximity to dwellings. The material of which the dwellings are constructed also governs the selection; as, for instance, the roots of some of the *Ficus* family, like the Moreton Bay Fig, are apt to get into the interstices of brick and stone work, and into drain pipes, thus doing much mischief. We can remember seeing in Germany a magnificent double avenue of immense poplar trees having to be cut down and rooted out owing to the damage done by the roots, and we believe that at Warwick numbers of fine willows near the waterworks had to be destroyed owing to the quantity of water absorbed by them, which in dry seasons had a serious effect on the water supply.

In temperate, and especially in damp climates, there is an actual advantage in deciduous trees, which in winter do not obstruct the sun's rays where these are all wanted. Even in our Queensland climate there are conditions in which deciduous trees may be advantageous. In the more thickly populated parts of cities, the atmosphere is often vitiated with smoke and noxious vapours, which prejudicially affect the health and appearance of evergreen trees, which, instead of things of beauty, become eyesores. Not so with deciduous trees. Every year they cast off their leaves, and with them the season's smoke and dirt. They have the further advantage of, once a year, producing fine effects when bursting into leaf or flower, the new and vigorous growth long resisting the malign influences of an unhealthy atmosphere. When these begin to be visible, the time has again arrived for the trees to discard their foliage, which is the only part injured, and put on their winter appearance. Even in warm climates the shade is not required in winter, and the shade of deciduous trees outside houses is analogous to that of blinds inside, and these trees have the advantage of being self-acting, keeping time with our seasons.

Of the deciduous trees the plane tree is perhaps the best of all, adapting itself to a considerable range of climate. It thrives equally well where the magnolia, camellia and azalea grow luxuriantly in the open. A most graceful, as well as stately looking tree in foliage, it

retains much of these characteristics when the leaves have fallen, being wholly without the gaunt and ungainly appearance of many deciduous trees during their period of rest. Fine specimens of this tree may be seen by travellers on the Southern and Western line, at the railway station at Grandchester. Their power of recuperation after injury is remarkable. Some evil-disposed person once "rung" the beautiful trees mentioned, and the curator of the Botanic Gardens, Mr. Walter Hill, we believe, succeeded in saving them and they have developed into magnificent trees. For street-planting in this country what is wanted are trees with wide-spreading heads to break the force of the sun, and planted as close as possible consistently with the free action of the roots, so as to bring about the result, as nearly as may be, of a continuous avenue. Too close planting, however, is a mistake, nothing less than 25 ft. apart being sufficient for ultimate growth.

There is no excuse for not planting about our houses, because the means are within reach of everyone. How many houses are built in this State with their fronts to the morning sun and the rear exposed to the fierce mid-day and western sun's rays, to the detriment of the health and comfort of the inmates and to the damage of paintwork. Another great advantage of trees is, that they exercise an important influence over the climate and rainfall of a country. This is now generally admitted, and the influence upon certain localities in the settled portions of Australia, when all the dense timber growth has been cleared off, is already making itself felt in the consequent diminished rainfall.

The enormous amount of clearing which has been done wherever the soil encouraged settlement is very great and is on the increase, and if it is possible that our already dry climate is changing for the worse as settlement progresses, then so far as this State is concerned, the sooner the discovery is made the better, and a remedy applied.

DESTRUCTION OF PRICKLY PEAR.

Mr. C. E. Corby, of Pallamallawa, who has a long experience in dealing with prickly pear, has invented a machine to eradicate this pest, which he claims is most successful. Fire is the destructive power. The machine itself looks like a motor on wheels, and by means of fans driving air through the barrel, a powerful blast is obtained, which, it is claimed, destroys the pear and its seed. The inventor states that the machine can be worked by a boy, and at a cost which (roughly) works out at 15s. per acre for dense pear, and from 6s. to 8s. for scattered pear. Mr. Geo. Valder, of the Department of Agriculture, has received the report of the officer in charge of prickly pear experiments, who gave the machine a thorough test in dense and scattered pear in February of last year, and at the end of six and twelve months respectively reported that the densest pear was completely done away with, and that, even where the pest was so thick that it was impossible to push the machine in amongst it, it had worked along the face of the growth and killed it out effectively. —"Producers' Agency."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Records of Cows for Month of June, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	6 Mar., 1914	754	4·6	40·86	
Lady Mary...	Ayrshire	10 Nov., 1913	711	3·6	29·93	
Lady Maid...	Shorthorn... ...	17 Mar., 1914	492	4·7	27·25	
Miss Bell ...	Jersey	25 Sept., 1913	395	5·8	27·10	
Gretchen ...	Holstein	6 May, 1914	830	2·8	26·97	
Bluebelle ...	Jersey	27 May ,,	761	3·2	26·16	
Nina ...	Shorthorn... ...	5 April ,,	622	3·4	24·71	
Madame Melba	Holstein	10 Nov., 1913	489	4·2	24·13	
Glen ...	Shorthorn... ...	27 Oct. ,,	388	5·2	23·82	
Cocoatina ...	Jersey	20 April, 1914	411	4·8	23·26	
Burton's Lily	Shorthorn... ...	29 Dec., 1913	409	4·7	22·65	
Miss Jean ...	Ayrshire	13 Jan., 1914	406	4·6	22·00	
Queen Kate	,, ...	4 Jan. ,,	446	4·2	22·00	
Miss Lark ...	,, ...	27 Dec., 1913	406	4·5	21·51	

Cows pastured on lucerne and natural pasture, supplemented with 20 lb. of chaff cow cane per head per day.

IMMUNITY AGAINST MOSQUITOES.

Referring to a communication from Mr. J. D. Howlett, of Urangan, on the subject of the entire absence of mosquitoes in certain localities, which appeared in the June issue of the Journal, Mr. J. F. Keane, of Granite Creek, Carbeen, Cairns, writes in corroboration of Mr. Howlett's statement as follows:—

"Touching the enclosed cutting from a local paper headed 'Remedy against Mosquitoes' and quoting 'Queensland Agricultural Journal,' I am pleased to be able to inform you that my house is in the middle of a small tract of land about two miles across, upon which I have never seen or heard a house fly or a mosquito. I have resided here five years and a-half, never having been more than twenty-four hours absent from the place. This entire immunity has always appeared to me most inexplicable and surprising, for the near-by conditions, such as an open rainwater tank, slaughtering gallows within a chain of the kitchen door, large sheets of shallow, still water in the vicinity, seem so favourable for the plagues. Moreover, outside the limit I have given, flies and mosquitoes are as troublesome all over the country as they are almost anywhere else in the tropics."

The Horse.

MULE-BREEDING IN POITOU, FRANCE.

From the "Pastoral Review," Melbourne, 16th June, 1914.

The mares used in Poitou for the breeding of mules are of northern origin, and are powerfully built, heavy animals, that have a strong resemblance to mules. Their withers' height averages 15¼ to 16¼ hands, the head is long and thin, the lips overhanging, and the ears pointed and long. The neck and chest are flat, the legs powerful, but coarse and very hairy. The colour of the coat varies. To improve the breed, about the year 1860 Flemish stallions were introduced, later, Percheron and Boulogne stallions and Breton mares, and for the last thirty years a stud book association has existed.

PLATE 40.—JACK MULE, SOLD FOR 180 GUINEAS.

The improved breed is composed of animals with more powerful necks and chests than those of the unimproved strains.

The mares are served between February and June; the foals are usually weaned at the age of six months. For the production of mules, fillies begin to be used at the age of two years. Fillies of this age, at the chief market, fetch from £24 to £36. Colts somewhat over two years make £32 to £48 upwards.

JACKS.—The Jacks used for the production of mules are commonly called "baudets." They have powerful heads, long and large ears, small eyes and deeply-built bodies, with round cruppers, and coarse legs with small hoofs. The colour should be dark; light coats and dark muzzles are avoided. For breeding purposes, jacks with long and curly

hair are preferred, as their offspring are credited with putting on flesh better than others.

The jacks are always kept in the stable, and fed on hay, straw and some oats. During the service season the rations are increased, and some wheaten or rye bread is added to them. The breeding of "baudets" is limited exclusively to private studs in the district of Melle, in Poitou. The asses are mated in August and September, immediately after the close of the service season for mares. After weaning, which takes place at the age of nine months, the foals are kept in stables. They begin to breed at the age of two and a-half years. The sales of jacks are held at the owners' stables. At the age of nine or ten months, the animals are worth from £40 to £100, at the age of two and a-half years, £80 to £160, and at four years they bring £200 to £240. First-class animals have not infrequently fetched £320 to £400. The trade in jennies is insignificant; they are sold at between £16 to £60.

Mules.—The mule of Poitou is especially suited for heavy work. Its neck is broad and muscular, its back is straight, the chest broad and deep, the loins broad, the croup round, the legs very powerful, with broad joints and small cylindrical hoofs. It stands 14¼ to 15¼ hands high. Its hair is short, rough, and generally dark-coloured. If the muzzle, the inside of the edge of the ear, and the insides of the thighs and forelegs are silver-white, then the black colour is called "boyard"; if these spots fail, the coat is described as "bouchard."

The young mule accompanies its dam in the pasture until it is weaned—usually at the age of seven or eight months. After this it is fed in the stable, and when it is two years old, it is broken in. Preparatory to being sold abroad at the age of three or four years, the animals are kept in dark stables and fed with good hay, barley, oats, and maize. They are sold only at the farms. The prices range from £24 to £40. Fattened foals from Poitou at prices of from £36 to £76 are imported by Spain, the province at Languedoc, Algeria, Belgium, Germany, and Italy. A certain number of mules are exhibited every year in Paris at the general livestock show.

THE DEATH OF CARBINE.

Carbine, the famous racehorse (says the "New Zealand Farmer") expired at Welbeck Abbey on 10th June.

Carbine had reached the great age of twenty-nine years, and for the past couple of years had been pensioned off at the farm of his owner, the Duke of Portland. The most noted horse ever bred south of the line, Carbine had a great career on the turf, where "Old Jack," as he was familiarly called, was the idol of the sport-loving public, and immense enthusiasm was roused by his many splendid victories. Lazy, almost sleepy, at the post, he fairly revelled in his work when the field was once away, and in spite of the ever-increasing weights put on his back, he added race after race to his record until his stake winnings, here and in Australia, reached the great sum of £29,976, his victories including the

Melbourne Cup, which he won under the great weight of 10 st. 5 lb. in record time.

Carbine was bred at Sylvia Park, Auckland, and was sold as a yearling to Mr. Dan O'Brien. He raced in his colours with great success, and was then sold to the Hon. D. Wallace, the famous Victorian stud-master.

In 1895 Carbine was sold to the Duke of Portland for £13,650, and was transported to England, where he sired many winners, including the Derby winner Spearmint. During his Australian career Carbine was trained by W. S. Higinbotham, and ridden by R. Ramsay.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1914.	June, 1913.
North Coast.	In.		In.	In.
Atherton	1·94	13	1·68	0·85
Cairns	2·42	27	2·79	0·62
Cardwell	1·75	27	3·75	0·55
Cooktown	2·02	27	7·21	0·64
Herberton	1·02	27	2·13	0·72
Ingham	2·34	22	9·06	0·52
Innisfail	6·60	27	8·45	1·84
Mossman	3·46	5	3·50	0·69
Townsville	1·45	30	4·55	0·54
Central Coast.				
Ayr	1·45	27	2·57	1·73
Bowen	1·76	27	4·75	5·42
Charters Towers ...	1·45	27	2·92	2·06
Mackay	2·57	27	9·17	3·75
Proserpine	3·81	11	12·55	6·69
St. Lawrence ...	2·33	27	7·09	4·82
South Coast.				
Crohamhurst ...	4·37	20	8·81	4·22
Biggenden	1·91	14	2·84	3·68
Bundaberg	2·87	27	2·89	3·45
Brisbane	2·68	63	4·00	4·65
Childers	2·36	19	4·53	3·71
Esk	2·02	27	4·12	4·76
Gayndah	1·70	27	2·61	2·91
Gympie	2·37	27	5·58	5·28
Glasshouse M'tains	4·68	6	7·85	...
Kilkivan	1·90	27	3·53	4·53
Maryborough ...	2·87	27	6·44	3·48

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June,	No. of Years' Records.	June, 1914.	June, 1913.
South Coast—continued:	In.	/	In.	In.
Nanango	1·96	27	3·25	4·58
Rockhampton ...	2·08	27	5·33	3·55
Woodford	2·72	27	5·01	3·94
Yandina	3·89	21	9·33	4·39
Darling Downs.				
Dalby	1·64	27	2·55	4·17
Emu Vale	1·32	17	1·66	4·47
Jimbour	1·49	24	2·03	4·15
Miles	1·94	27	2·91	4·14
Stanthorpe ...	1·92	27	2·03	3·93
Toowoomba ...	2·24	27	3·32	5·73
Warwick	1·69	27	2·15	3·42
Maranoa.				
Roma	1·84	25	2·36	3·15
State Farms, &c.				
Gatton College ...	1·52	14	3·01	4·09
Gindie	1·50	13	3·44	4·53
Kamerunga Nurs'y	2·85	23	2·80	0·39
Kairi	...	..	1·66	1·01
Sugar Experiment Station, Mackay	2·20	16	8·98	3·83
Bungeworgorai ...	...	...	2·38	2·73
Warren	...	...	4·54	3·51
Hermitage ...	2·01	7	2·34	3·96

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1914.

3,452 eggs were laid during the month. Most of the pens have done good work during the last fortnight. J. Murchie and the Range Poultry Farm had had only one bird each laying until the last few days, the latter producing three eggs on the 30th. J. F. Coates (Black Orpingtons) wins the monthly prize with 133 eggs. The following are the individual records:—

Competitors.	Breed.	June.	Total.
T. Fanning	White Leghorns	132	344
A. T. Coomber	Do.	100	317
Kelvin Poultry Farm	Do.	117	309
Loloma Poultry Farm, N.S.W.	Do.	100	246
Loloma Poultry Farm, N.S.W.	Rhode Island Reds	106	233
Moritz Bros., S.A.	White Leghorns	118	226
J. T. Coates	Black Orpingtons	133	223
J. R. Wilson	White Legborns	110	212
G. E. Austin	Do.	77	207
Mrs. Bieber	Brown Leghorns	73	205
Cowan Bros., N.S W.	White Leghorns	82	200
R. Jobling, N.S.W.	Do.	88	197
J. Gosley	Do.	80	192
G. Tomlinson	Do.	119	186
J. D. Nicholson, N.S.W.	Do.	100	182
A. F. Camkin, N.S.W.	Do.	92	180
R. Burns	Black Orpingtons (No. 1)	115	179
J. Kilroe	White Leghorns (No. 1)	89	174
J. M. Manson	Do. (No. 1)	79	165
J. N. Waugh, N.S.W.	Do.	96	162
Marville Poultry Farm, Victoria	Do.	91	157
R. Burns	S. L. Wyandottes	111	153
J. Kilroe	White Leghorns (No. 2)	49	151
E. Le Breton	Do.	95	148
Mrs. Munro	Do.	69	147
R. Burns	Black Orpingtons (No. 2)	102	146
J. T. Coates	White Leghorns	80	146
A. H. Padman, S.A.	Do.	72	143
J. Franklin	Do.	92	141
Derrylin Poultry Farm	Do.	87	138
F. McCauley	Do.	81	135
E. V. Bennett, S.A.	Do.	87	131
D. Morton, N.S.W.	Do.	88	127
Mrs. W. D. Bradburne, N.S.W.	Do.	54	126
J. M. Manson	Do. (No. 2)	66	117
J. Zahl	Do.	48	110
C. M. Jones	Do.	35	103
Range Poultry Farm	Do.	24	101
T. Fanning	Black Orpingtons	84	92
J. Murchie	Brown Leghorns	31	78
Total	...	3,452	6,929

THE HEN WHICH LAYS 300 EGGS PER ANNUM.

The "Revue Agricole" of the Island of Réunion reprints the following article on the egg-laying capabilities of different breeds of poultry from the "Agriculture Nouvelle":—

"As we announced in our article on 28th February, we propose to consider in a special manner the question of egg-laying by poultry. The great English and American journals have published long articles on the experiments carried out by Professor Dryden of the Oregon Agricultural College, and we have promised our readers to put them in touch with these experiments. At the same time, we must at once remark that it is not only amongst the American birds that one can gather very high records in this respect. Amongst our French fowls, even common barn-door fowls, one can obtain equal results with those obtained at the famous egg-laying competitions, the very great utility of which it would be futile to deny. Later on, we shall demonstrate this and support our contention by proof.

"The rapid increase in the production of eggs consists, to my mind, simply in the selection and feeding of the hens; we have stated this for twenty years, and we shall long continue to do so.

"Before considering what one can do in France, we will note what is done in foreign countries.

"It is to America and Australia that the splendid impulse given to egg-laying competitions is due. Numbers of hens of particular breeds are gathered together in pens for a year at a time; the figures as to the eggs laid are recorded; the eggs of those breeds which have proved the best layers are specially put aside for hatching, and at the end of very few years it becomes evident that the egg-laying powers of such breeds have sensibly increased. This method of selection is so elementary that we claim no credit for having foretold it long ago. The matter for astonishment is, that this method has not been more strictly adopted in our French poultry-yards.

"These competitions, moreover, furnish a valuable object-lesson as to the value of the different breeds. We could mention several, as we have taken account of them whenever they were brought to our notice. Amongst those competitions which we have in view, we will mention a very characteristic one, which took place some years ago, under the auspices of the Sydney "Daily Telegraph."

"Two simultaneous competitions were organised in two Australian Agricultural Colleges—Hawkesbury and Rockdale. Climatic differences considerably modified the yield of eggs of the different pens in one or the other college. At Rockdale, which is much more protected from cold winds, and where the intense heat of summer is not so much felt as at Hawkesbury, the average number of eggs laid was 192 per hen, whilst at Hawkesbury the average was only 106 eggs per hen. Yet at the latter

college the pens were much larger and better turfed than in those of the former. It is particularly interesting to note this. Each lot entered for competition consists of six fowls. Their food is bran mash and a mess of beef hashed and boiled, maize and wheat: every day they receive a ration of green food, consisting of cabbage and a green fodder known in that country as alfalfa—[Lucerne.—Ed.]

"Mr. Charles Voitellier, Professor of the Agronomical Institute, furnishes a complete account of this competition to the Bulletin of the Agricultural Society of Meaux. From it we ('Agriculture Nouvelle') take the following:—

> The first prize was carried off by a pen of six Black Orpingtons, which had laid 1,461 eggs in twelve months. The average weight of the eggs was 60 gr. 24, and the total weight 87 kil. 660 (over 191 lb.). The second prize fell to a pen of White Leghorns, which laid 1,443 eggs, of an average weight of 67 gr. 32, the total weight being 97 kil. 156 (about 234 lb.). The average production in the two competitions was as follows:—

Hawkesbury Agricultural College.

Comparison of Number of Hens.	Breed.	Eggs per Hen.
12	Imperial	200
6	Black Hamburg	197
12	Langshan	184
12	Brown Leghorn, single comb	179
12	Andalusians	179
12	Golden Wyandotte	178
12	White Leghorn, Rose comb	173
6	Faverolles	173
24	Fawn Leghorns	171
18	Brown Leghorns, Rose comb	169
120	White Leghorns, single comb	167
120	Silver Wyandotte	165
114	Black Orpington	158
30	Buff Orpington	157
12	White Wyandotte	149
18	Minorcas	147
12	Buff Wyandotte	146
6	Campine	146
6	Ancona	132
6	English Game	159

Rockdale.

6	Minorcas	237
6	Langshan	218
6	Black Hamburg	216
6	White Leghorn, Rose comb	202
12	Brown Leghorn, single comb	202
78	White Leghorn	201
78	Black Orpington	197
12	Brown Leghorn, Rose comb	185
96	Silver Wyandotte	184

"From the value of breed point of view, the Silver Wyandottes, White Leghorns, and Black Orpingtons, represented by 120 and 114 birds on the one hand, and 78 and 96 on the other, furnish a valuable lesson. The number of birds taking part in the competitions admits of our drawing a serious conclusion as to the value of the breeds, but, nevertheless, we consider that if the aptitude for laying is a racial quality, it is still more an individual quality. In all breeds there are mediocre, good, and very good layers, and, to our mind, the choice should not fall on the hen which lays the most eggs, but on the one which produces the greatest weight of eggs, and the White Leghorns which have laid 97 kil. 154 of eggs, were more worthy of the first prize than the Black Orpingtons which had only laid 87 kil. 660. But this is a reflection by the way, with the object of emphasising that the practical selection should have been in favour of the White Leghorns which showed a special individual aptitude far superior to the hens of the same race in competition.

"It was this same view that the Americans have taken as we shall show by the experiments of Professor Dryden."

[On receipt of the June issue of the "Revue Agricole," this subject will be continued.—Ed. "Q.A.J."]

ORANGE WINE.

In a tub or vat of 15 gal. or 20 gal. capacity, carefully cleaned, put 40 lb. of peeled oranges, rejecting any unsound ones. Then bruise the fruit, and pour 4 gal. of water over it. Stir the whole carefully, and work well with the hands until the juice and pulp are separated from the solid matter. Then let the whole rest for 10 or 24 hours, and strain through a coarse bag, with gentle pressure. A gallon of fresh water is to be added to the mash to remove any soluble matter remaining, and is strained into the other liquor. From 25 lb. to 30 lb. of white sugar are next dissolved in the must or juice thus obtained, and the measure of fluid increased by more water to 10½ gal. The must is next put in a tub or vat, over which a blanket is thrown and a board over that, and the whole kept at a temperature between 55 deg. and 60 deg. Here it must remain from 12 to 24 hours, according to the state of the fermentative process. It is then to be drawn off into a cask until the fluid nearly reaches the bunghole, so that the scum may overflow and be thrown out. As fermentation goes on, and the bulk of the liquid diminishes in the cask, the superfluous must made for that purpose should be poured in, so as to keep the liquid near the bunghole. When the fermentation diminishes still more, which may be known by the reduction of the hissing sound, the bung is driven in, and a gimlet-hole bored on one side. Put a wooden peg in this hole, and remove it from time to time to let the gas escape. When the escape of gas is too feeble to extinguish a lighted match, knock the peg in for good. Then fine the wine with a table-spoonful of isinglass, and in a few weeks it will be fit for bottling.

State Farms.

NOTES FROM KAMERUNGA STATE NURSERY FOR JUNE, 1914.

Rainfall for the month, 280 points; 7 days on which rain fell; maximum solar reading, 147 degrees; terrestrial, 47 degrees.

The month has been a dry one for June, the rainfall being below the average for twenty-three years, and owing to dry winds the surface soil in many parts got very dry, as, being chiefly hoe work, all could not be broken at once.

Coffee, from the few trees bearing here, is nearly finished, this being about the earliest I can remember.

In one plot the tops of yams have died down, though, owing to late planting, the tubers are scarcely one-third grown. The same is noticeable with gingers and turmeric, and so far I am unable to account for it, as they should have continued growing for another two months.

A few stools of bananas were limed at the rate of about 5 cwt. per acre, while others were manured with a complete manure.

Para rubber-trees are being tapped, and it is noticeable that those trees which received a dressing at the rate of 1 lb. of nitrate of soda per tree are milking the best.

ROMA STATE FARM.

REPORT FOR THE MONTH ENDING 13TH JULY, 1914.

Meteorological.—At time of writing wintry conditions prevail, very heavy frosts having been experienced during the past week. These will do an inestimable amount of good, as previously little cold weather has been recorded, so it was feared that an early summer was to be experienced, and that vines, deciduous fruits, &c., would have too short a resting period to benefit therefrom. The cold has also given a necessary check to the wheat crops, which, in some instances, where early sown, were inclined to be spindly and run up into short blade. In addition to the aforementioned benefits, the wintry conditions have destroyed a great deal of summer vegetation induced to grow by the mild conditions experienced a few days following the recent rains, and may prove very serviceable in reducing the number of caterpillars, &c., which are very prevalent for this period of the year.

The maximum temperature recorded was 70·5, *average* 64·7.

The minimum temperature recorded was 28·5, *average* 41·9.

Rainfall.—263 points, representing four wet days.

Winter Cereals.—These on the whole look exceptionally well, the season so far leaving very little to be desired in respect to these crops where sown at the proper season. Early sown areas are inclined to be more forward this season than for some years past, but these can be

converted into hay should the necessity arise, and those sown for this purpose can be permitted to stand for grain.

Rain has retarded cropping operations, only 15 acres having been sown of the 32 it is intended to put in since forwarding previous report.

Orchard (Deciduous).—With the exception of some young apricots and peaches, and the October purple plum, the trees coming under this heading have lost their leaves. The pruning of the apricots has been begun.

Citrus.—These trees so far display no ill-effects from the severe frosts. The replants made this season have been kept covered at night in anticipation of a cold snap, and it is hoped that the precautions taken will prove effective.

Vineyard.—Some of the varieties still retain their autumn foliage. Pruning operations have been delayed in this branch owing to the absence of sufficient frost to check the flow of sap, and had not the weather as aforementioned been experienced, some of the varieties would have no doubt commenced to swell their buds.

Peanuts.—During the period under review a small plot of one-twentieth of an acre of these, grown from seed received through Head Office from China, have been harvested. The yield obtained was fairly good and, as they appear to be superior to the ordinary peanut in many ways, are being reserved for seed purposes, some of which will be available to growers at a price fixed by Head Office.

Cowcane.—A sample of this was planted some two years ago, the sets having been obtained at the National Exhibition, Brisbane. During the period it has been under observation it has withstood the dry conditions experienced well, as well as the frosts, and at time of writing is still green, though the sorghums and allied crops have been bleached for a month past.

General.—Live stock of all descriptions look exceptionally well.

WARREN.

The Acting Manager, reporting on 15th July, writes:—

Weather Conditions.—The weather conditions during the month of June proved excellent, inasmuch that 454 points of rain were registered, this representing seven falls well distributed throughout the month.

Conditions were becoming rather critical round this district, but the good rains have relieved the anxiety felt by the farmers in general, and conditions are again satisfactory.

Crops.—The cereal crops progressing excellently. We have now 35 acres under winter cereals, the crop being composed of Kubanka, La Hugnenot, Farrer's Durum, Cedar, and Zealand wheats, Californian feed barley, and rye. One acre has been sown with canary seed, and is now growing well.

Maize.—The maize crop has been completely harvested. Four varieties were sown this year, the total amount of land under maize being 14 acres. Too much stress cannot be laid on the necessity of field selec-

tion of maize for seed purposes. Maize is one of our most valuable crops, both for silage and grain, and marvellous results have been obtained in the growing of this crop in America. Their successes are, without doubt, due to a large extent to the fact that the maize has been grown from specially selected seed, care being taken to see that such seed is fertile, true to type, and adaptable to the climatic conditions and soil. The variety grown this year was Boone County White. This variety has proved itself superior in every respect to the other three varieties grown here, and too much cannot be said of it.

Potatoes.—The potato crop has been harvested, the result on the whole being satisfactory. The soil in which the seed was planted was of a loose, sandy nature, well drained and rich in nitrogenous matter, a crop of lucerne previously having grown there. No fertilisers were used. This was well worked up before planting and allowed to lie, a fair amount of moisture being obtained. The varieties planted were as follows:—Up-to-Date, Cannan No. 1, Brounell's Beauty, and Defiance.

Up-to-Date: This is a flattish, white-skinned, kidney-shaped variety, with very few eyes. It is usually a very heavy cropper. In this case the seed was well sprouted and uncut. Germination proved good, but subsequent growth checked. This gave a fair yield, but not what was anticipated. The early frosts in May killed the haulms, but did not harm the tubers.

Cannan No. 1: This is a white-skinned tuber, of excellent appearance, and a good cropper under favourable conditions, being well liked on the market for its cooking qualities. The seed in this case was very poor and on the large side. The seed was cut when planted. Germination was very uneven, and in after-growth the plants ran mostly to top. The resultant yield was poor, this variety proving unsuccessful when compared with the others.

Brounell's Beauty: This is, without doubt, the best variety for our district, and is widely grown all over the State. There is no red skin variety better known and no potato more largely grown and giving such splendid results. It is a very heavy yielding variety, and can nearly always be depended upon. One of the finest table potatoes in cultivation. The seed was cut, and the resultant yield heavy. This potato can be recommended.

Defiance: A new white-skinned variety, noted for its blight-resistant qualities, imported from England, where it has been grown with success. When received, the seed was well sprouted, but had been damaged to some extent in shipping. Germination proved very uneven, but subsequent growth good. When harvested, this variety did not yield heavily, the tubers being very small. A larger yield could hardly have been expected, but the crop grown from this year's seed will have a much better chance.

The potato crop, as a whole, has been practically free from disease of any kind, no signs of blight being evident.

Dairying Operations.—Throughout the month the cows milked well, the bountiful rains providing succulent green food. No hand feeding has been resorted to, this state of affairs being most gratifying. All young stock are in splendid condition and thriving well.

The Orchard.

THE MANURING OF BANANAS.

BY J. C. BRÜNNICH, F.I.C., Chemist to the Department of Agriculture and Stock, Queensland.

[Paper read before International Congress of Tropical Agriculture.]

On looking through the publications on banana culture one must notice the fact that the manuring of this crop receives but scant treatment, and very few results of manurial experiments are reported. In a recent paper on Bananas and their Utilisation (1.), which undoubtedly is an up-to-date and most comprehensive treatise, the manuring of the crop gets a bare two pages out of a total of 120 pages. This is not to be wondered at when we consider that hitherto in all banana-growing countries the culture of this plant was of a most reckless nature, a veritable "Raubbau" in the fullest sense of the word, as large areas of country under bananas were simply continually cropped, for years and years, without any attention to manuring, and abandoned when the crop, due to complete exhaustion of the soil, became unprofitable. New lands had then to be taken up, cleared, and put under bananas. This state of affairs continued as long as land near the seaboard was available.

It was fortunate that in the State of Queensland such abandoned banana lands were found to be eminently suitable for the growth of other crops, and more particularly sugar-cane, and thus the great waste of leaving large stretches of fertile lands uncultivated was avoided. The banana industry itself, however, suffered as, from a yearly crop of about 4,500,000 bunches in 1898, it dropped to an average yield of a little over 1,000,000 bunches in the last few years. The cultivation, which was originally entirely in the hands of Chinamen, passed more and more into the hands of European farmers, and for this reason it was desirable to find means to utilise old banana lands again for banana culture.

The carrying out of manuring experiments in the Northern tropical district presents many difficulties, and one series of experiments established by the Department of Agriculture and Stock, under my directions, had to be abandoned. Another series was started last year in the neighbourhood of the Kamerunga State Nursery, and this already has suffered from very adverse climatic conditions—an unprecedented spell of dry weather last year, followed by exceptionally heavy rains this year.

Several manurial experiments carried out in Southern Queensland, under sub-tropical conditions, gave excellent results, and demonstrated beyond doubt that exhausted banana lands may, by thorough cultivation and the aid of heavy dressings of artificial fertilisers, produce crops equalling the crops obtained from virgin lands.

Of course, not all exhausted lands may give such good results, as it is of great importance that the soil be in good physical condition, and above all, contain a fair amount of humus.

As to the class of soil required for banana culture, authorities somewhat differ, but the contradictory statements one meets are, perhaps, more apparent than real, and are largely influenced by local conditions.

Like all tropical plants, bananas require an abundant and regular supply of moisture, and therefore the soil must possess a good water-holding capacity, still be well drained, to prevent the water becoming stagnant near the surface.

The manager of the Experimental Garden at Kivai (German East Africa) states (2.): "Bananas like moist swampy flats with a rich fat soil. Soil rich in humus always yields larger crops of bananas than clayey soil."

Against this statement, which undoubtedly is due to exceptional local conditions, we must note in Dr. Grotewold's paper on banana culture (3.), that bananas love moisture, but do not thrive in swamps. Soils must also be free from excessive amounts of salt, and flats containing an excess of salts may be made fit for cultivation by flooding them with water for some time, as practised in Columbia.

With regard to humus Henrickson states (4.) that while it is desirable it is not absolutely essential, because most of the soils producing bananas in Jamaica contain but very little humus. The typical banana soils of Annatto Bay and Port Antonia district, on the north coast, are rather heavy clays, but the most profitable plantations are on soils of loamy consistency. The soil described as the most ideal soil for bananas at Portland, by the Government Chemist, Mr. H. H. Cousins (Jamaica Bulletin, October, 1901) contains such an enormous amount of humus and plant foods, that it resembles more a rich compost than an ordinary soil, as shown by its analysis:

Humus	9·86 per cent.
Moisture	24·86 per cent.
Combined water and organic matter	25·10 per cent.
Nitrogen	·70 per cent.
*Potash	·68 per cent.
*Lime	1·38 per cent.
*Phosphoric acid	2·76 per cent.
*Available potash	·0571 per cent.
*Available phosphoric acid	·0908 per cent.

*Calculated on the dry soil.

Other soils from St. Catherine, Jamaica, growing bananas successfully are reported by the same authority to contain—

*Humus	1·79—1·54 per cent.
*Nitrogen	·157—·147 per cent.
*Potash	·38— ·43 per cent.
*Lime	1·00—1·51 per cent.
*Phosphoric acid	·21— ·19 per cent.
*Available potash	·0518—·0108 per cent.
*Available phosphoric acid	·0624—·0695 per cent.

*Calculated on air-dry soil.

These analyses quoted (5.) represent pretty well the extremes of banana soils, and the good results obtained with the two latter soils, containing rather small amounts of humus, must be due to exceptionally favourable climatic conditions.

There can be no doubt, from all the evidence obtainable, that bananas require a well-drained, loamy soil, containing a fair amount of humus, and good amounts of potash, lime, and phosphoric acid in readily available form.

With regard to the manuring of bananas, the following may be quoted:—

Bernegan states (6.) that the cultivation of bananas made enormous progress in Teneriffe, due to irrigation. The Cavendish variety is principally grown, planted 10 ft. apart, and heavily manured with dung (stable compost) and guano.

Artificial fertilisers, more particularly potash manures, give good results in the banana culture in India. (7.)

To the natives of the Lake Victoria Nyanza districts the most important culture is that of bananas. They receive the greatest care and the largest amounts of dung. (8.)

Lime is of great importance to bananas, and experiments in Panama have proved the great benefits of liming soil in the cultivation of bananas. This is also proved by our own manurial experiments.

Phosphoric acid is of great value, but more particularly potash must be supplied in liberal amounts. A number of fertiliser experiments reported by J. M. Hattrick (9.) as carried out in Queensland and in Fiji fully bear this out, and the author quoted states: *That for every* 1*s. spent on potash, the planter received* 6*s. in return.*

With regard to the conservation of humus in banana soils, it must be stated that a good deal is returned to the soil by the stalks of the plant after the bunch has been cut. The method practised in Jamaica, to cut the stalks into small pieces, is undoubtedly to be preferred to the method generally practised in Queensland of cutting the stalk down and allowing it to rot near the stool of growing bananas. It is stated (5.) that one man can chop 100 stalks into small pieces in a day. The growing of green manure crops, like velvet beans, Mauritius beans, etc., is practised in some localities and can be strongly recommended, as long as the cover crop is not allowed to grow too near to the stools, so as to prevent robbing the bananas of necessary moisture.

The only evidence about replanting of old banana lands I could find refers to Costa Rica, where periodical inundations keep up the fertility of the soil (10.). As a rule banana lands are replanted every six to seven years, but in some cases, with flooded lands, plantations fifteen years old give as good a return as in their second and third year. A porous, sandy clay is preferred for bananas.

Isolated cases of abandoned old banana fields being replanted and yielding good crops, even without the aid of manures, have been reported

in Queensland. But I have no doubt whatever that the crops, with the aid of fertilisers, would have been much better, and certainly much more lasting, as nobody can dispute the correctness of Semler's statement (11.): That no other cultivated plant exhausts the soil to such an extent as bananas.

This statement is fully borne out (1) by the comparison of the analyses of the soils from virgin land and exhausted banana land, in which the total amount of potash present is reduced by nearly one-half, and the amount of available potash remaining is less than one-tenth of that found originally (*see* "Soil Analyses," Table III.); and (2) by a study of the actual food requirements of the banana plants based on the analyses of plant and fruits of the three principal varieties, carried out in our departmental chemical laboratory. (See Table I.) From this investigation we learn that a fair crop of Cavendish bananas removes in the fruit 123 lb. of potash, 12½ lb. of phosphoric acid, and 43·7 lb. of nitrogen, whereas the stalks left on the ground contain 150 lb. of potash, 6 lb. of phosphoric acid, and 41·4 lb. of nitrogen. Practically speaking, therefore, 273 lb. of potash, or about 5 cwt. of sulphate of potash per acre, must be available to the banana plant in a readily available form to produce its growth and crop in a few months.

At the time of planning the fertiliser experiments on the exhausted lands these figures were not yet available, and our manurial basis was fixed quite arbitrarily, at K = 80 lb. potash, P = 80 lb. phosphoric acid, and N = 40 lb. nitrogen per acre.

The results of the growth during the first year were so striking that the amount of potash was doubled for all further applications, thus making our normal fertiliser to contain K = 160 lb. potash, P = 80 lb. phosphoric acid, and N = 40 lb. nitrogen, applied twice a year to normal crops, and in double quantities 2 (KPN) to crops on exhausted lands.

For the experiments, two blocks of land at the two ends of the small fertile tableland on Buderim Mountain were chosen. The results of both are practically identical, so that we need to study only the results of one. The soil is a porous, red, volcanic loam of good depth, but at the time of preparing it for cultivation, so worn out that even weeds and grass would barely grow on it. The soil contained a good amount of humus (in all cases determined after Rather's modification of the Grandeau method (12.)) and a good amount of total phosphoric acid and nitrogen, but was low in total potash and lime, and very deficient in available phosphoric acid and potash. (See Analyses Table III.)

Each block was divided into two of 1 acre each; the first series was planted in 1909, and the second series in 1910, after being kept under a green manure crop for the year.

The land was ploughed at first shallow, with narrow furrows, harrowed and cross-harrowed several times, until all the couch grass and weeds were removed. One month before the planting the land was ploughed deeply, followed by a subsoiler working down to a depth of 18 to 24 in. The ground was again harrowed and cross-harrowed before

making the plant holes in October. The variety of bananas planted were Cavendish, the most profitable and the hardiest of the dwarf varieties, and the plant holes were made 12 ft. apart, giving 302 plants per acre, and 28 stools to each experiment. The first lot of manure was applied in the plant hole, well mixed with the soil, and the subsequent applications were made as top dressings and slightly hoed under.

I may here state that I believe, in case of old banana plantations, it is better to apply part of the artificial fertilisers in holes made with a crow-bar to a depth from 18 to 24 in. all round the banana stool at a distance of from 3 to 5 ft., and the rest as top dressing.

The Narico beans planted on the second block as a green manure crop did not grow too well, although well manured, and this must have been due to want of lime in the soil. The crop was ploughed in and the second series of bananas planted, September, 1910.

The result of the experiments as shown by the yield—Table II.—speak for themselves, and the photographs of some of the rows show the benefit of manuring in a graphic manner.

Rows 1 and 2 of the first series may be left out of account, as the land at that point is a little low-lying, and suffered from heavy washaways during storms in the first year of growth, and the stools were also more directly exposed to the cold winter winds.

The unmanured and lightly manured experiments showed from the very start want of vigour in the plants, and demonstrated clearly what to expect when replanting such land without artificial fertilisers, whereas the experiments with double manuring gave excellent yields. A striking feature is the formation of so-called blind bunches. The banana sucker, as soon as the bunch appears, seems to lose its vitality, the leaves drop off, and the stalk bends over and often breaks off, as if it had not sufficient strength to support the small bunch. The majority of bunches from the unmanured and slightly manured experiments were of this nature. The heavily manured plots produced good heavy bunches and the plants are much more robust to withstand the severity of the cold weather during the winter months.

In my Sixth Progress Report ("Queensland Agricultural Journal," June, 1913) I stated that the quantities of artificial fertilisers applied can be well considered a world's record, as in some instance nearly 2 tons of artificial fertilisers are applied yearly, and the cost of the manure, 2 (KPN), amounts to about £25 per acre, and in the plots where lime was applied in addition to the other fertiliser, to £29 per acre.

The average yield of the experimental plots (KPN), taking the average of eight experimental plots for three years, was 345 bunches,

with 3,035 dozens of bananas per acre per annum, at a value of, say, £38, the artificial fertiliser costing annually about £12 10s.

In the experiments 2 (KPN), we obtained an average yield of 457 bunches, with 4,330 dozen, of a value of £54 per acre, showing an increased net profit over the yield obtained from plots (KPN).

The record yield was given by Experiment 12 in 1912-13 with 30 dozen per stool (second year's crop), which, however, yielded up to March, 1914, only 14¾ dozen, whereas Experiment 20, which yielded 21¾ dozen in 1912-13 gave this last harvest 28½ dozen. Very remarkable is the yield of the two unmanured plots, 15 and 16, giving 11 and 17 dozen respectively in 1912-13, and this harvest 5½ and 16¼ dozen respectively, showing clearly the influence of the long dry period during 1913 on the unlimed and limed unmanured experiments, and proving the advantage of liming.

The owner of the experimental land also conducted on his own an experiment with a mixed artificial fertiliser, frequently used for manuring in the district. Using this fertiliser at the rate of 6 lb. per stool or 16½ cwt. per acre, he applied, expressed in our standard, ¾ K 3½ P 1½ N, but the results were exceedingly disappointing, clearly indicating the want of potash.

With regard to the application of phosphoric acid, it appears that Thomas phosphate gives good results, and in this red soil superphosphates soon change into insoluble phosphates. As superphosphates are more easily obtained, they were exclusively used for the second series.

Nitrogen acts undoubtedly best in form of dried blood, and as nitrate of lime.

The application of salt in addition to the manure, does not appear to make any appreciable difference, and it appears that the plant gets a sufficient amount of salt from the soil.

In the close neighbourhood of the experimental block the head teacher of the State School carried out some manuring experiments with bananas, besides growing different varieties. The soil was a virgin soil of good quality and the results of his experiments show that for virgin soil the application of our standard KPN (twice a year) gave the most profitable harvest.

Application :	0	(PN)	(KPN)	2 (KPN)
Cost of manure per acre ..	Nil	£9 8s. 6d.	£12 6s. 6d.	£23 4s.
Value of crop per acre	£28 11s. 9d.	£39 3s.	£67 2s. 3d.	£55 15s. 2d.

The incomplete fertiliser (without potash) did but barely pay for the application of the fertiliser as compared with the unmanured plot, showing the importance of potash to the banana plant.

Of particular interest to the agriculturist will be the question, how such heavy manurial dressings affect the physical and chemical nature of the soil. New samples of soil were taken after the experiments had been in progress for four years. One sample was attained from the unmanured row, No. 15; another one was taken from the heavily manured row, No. 12, a few feet from the stools, where the fertiliser was applied; another sample was taken between rows 15 and 16; and, lastly, a sample between heavily manured rows 19 and 20, where lime was applied. This last sample shows that the manure does not spread its effect to any distance and that the plants evidently utilise it as soon as it is applied. In row 12, we find only a distinct increase in the amounts of available plant foods.

The physical condition of the soil was improved by cultivation and manuring, and the soil is now in an excellent condition, capable of producing good crops, as the plants are enabled to utilise the fertilisers easily. The owners of the experimental plots are quite convinced of the profits derived from the application of our complete fertiliser, and are continuing its use on these and other areas under bananas.

As a conclusion, I am justified to state that an application of the principles evolved from our fertiliser trials to other areas of old banana lands would lead to a considerable expansion of the industry, as it will be found that most of the old lands, all of which are in easily accessible localities, will give profitable yields.

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TABLE I.—Analyses of Banana Plants and Fruits Grown on Buderim Mountain.

	Banana Plants: Ash.						Banana Fruits: Ash.					
	Lady's Finger.		Cavendish.		Sugar.		Lady's Finger.		Cavendish.		Sugar.	
	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.	—	Pure Ash.
		%		%		%		%		%		%
Weight of green plant	118 lb.	..	52 lb.	..	62 lb.	..	..	..	..	..	..	..
Weight of bunch	..	..	..	..	..	..	22 lb.	..	39 lb.	..	16 lb.	..
Approximate number of bunches per acre	..	..	..	..	..	..	432	..	555	..	460	..
Moisture per cent.	87·69	..	90·00	..	85·54	..	75·9	..	79·8	..	72·75	..
Dry material per cent.	12·31	..	10·00	..	14·46	..	24·1	..	20·2	..	27·25	..
Pure Ash per cent.	1·14	..	1·31	..	1·14	..	1·18	..	·94	..	·92	..
Containing—												
Silica, SiO_2	·270	23·68	·201	15·34	·245	21·49	·082	6·960	·059	6·225	·063	6·923
Iron and Alumina, $Fe_2O_3Al_2O_3$	·015	1·32	·023	1·77	·021	1·88	·033	2·835	·010	1·112	·037	4·061
Manganese Oxide, MnO	·026	2·32	·023	1·77	·021	1·88	·001	·119	·002	·200	·001	·115
Lime, CaO	·219	19·24	·278	21·33	·151	13·25	·039	3·324	·020	2·125	·018	2·016
Magnesia, MgO	·064	5·66	·092	7·02	·100	8·77	·071	5·995	·056	5·925	·056	6·091
Soda, Na_2O	·050	4·44	·021	1·60	·022	2·00	·033	2·815	·018	1·880	·023	2·506
Potash, K_2O	·378	33·17	·480	36·64	·437	38·33	·734	62·350	·605	64·250	·555	60·625
Sulphuric Acid, SO_3	·007	·66	·018	1·38	·020	1·75	·017	1·445	·013	1·329	·015	1·659
Phosphoric Acid, P_2O_5	·030	2·65	·019	1·46	·040	3·52	·083	7·010	·058	6·150	·071	7·748
Chlorine, Cl	·121	10·62	·199	15·20	·103	9·10	·108	9·175	·130	13·900	·098	10·728
Nitrogen, N	·107	..	·133	..	·136	..	·212	..	·202	..	·304	..

	Lb. of Plant Food.						Lb. of Plant Food.					
	In each Plant.	In Plants per Acre.	In each Plant.	In Plants per Acre.	In each Plant.	In Plants per Acre.	In each Bunch.	In Bunches per Acre.	In each Bunch.	In Bunches per Acre.	In each Bunch.	In Bunches per Acre.
Lime, CaO	·258	154·8	·044	86·4	·093	55·8	·0086	3·73	·0079	4·37	·0029	1·36
Magnesia, MgO	·075	45·0	·048	28·8	·062	37·2	·0155	6·70	·0217	12·03	·0089	4·10
Potash, K_2O	·446	267·6	·250	150·0	·272	163·2	·1615	69·75	·2360	123·09	·0888	40·80
Phosphoric Acid, P_2O	·035	21·0	·010	6·0	·025	15·0	·0182	7·84	·0226	12·50	·0113	5·21
Nitrogen, N	·126	75·6	·069	41·4	·084	50·4	·0466	20·15	·0787	43·70	·0486	2·38

TABLE II.

CROP RESULTS OF BANANA MANURING EXPERIMENTS ON BUDERIM MOUNTAIN.

1ST SERIES.

Number of Experiments and Fertilisers Used.	Total of Four Years' Crops per Acre.		Average Yield per Year per Acre.
	Dozen.	Bunches.	Dozen.
1. KPNb	5,393	625	1,348
2. 2 [KPNb]	7,637	971	1,909
3. ½ [KPNb]	3,047	528	762
4. Nil.	442	86	110
5. ½ [KPNn]	6,041	863	1,510
6. 2 [KPNn]	13,650	1,489	3,412
7. KPtNn	10,204	1,262	2,551
8. KPNa	7,750	884	1,937
9. 2 [KPNa]	14,034	1,639	3,508
10. KPtNa	12,470	1,402	3,118

2ND SERIES.

	Total of Three Years' Crops per Acre.		Average Yield per Year per Acre.	Crops, 1913-14, per Acre.	
	Dozen.	Bunches.	Dozen.	Dozen.	Bunches.
11. 2 [KPNb]	9,799	1,165	3,266	4,700	496
12. 2 [KPNn]	12,710	1,413	4,237	4,470	432
13. 2 [KPNn] + salt	10,435	1,284	3,478	4,530	485
14. 2 [KPNb] + salt	10,042	1,230	3,347	3,880	400
15. Nil.	5,280	820	1,760	1,639	216
16. Nil + lime	6,489	971	2,163	4,910	550
17. 2 [KPNn] + lime	9,966	1,165	3,322	4,710	485
18. 2 [KPNb] + lime	10,596	1,262	3,532	7,070	712
19. 2 [KPNn] + lime + salt ..	9,260	1,068	3,087	7,515	701
20. 2 [KPNb] + lime + salt ..	8,969	1,122	2,989	7,955	733

K = 160 lb. K_2O applied as 320 lb. potassium sulphate per acre.
Nb = 40 lb. N applied as 290 lb. dried blood per acre.
Nn = 40 lb. N applied as 290 lb. nitrate of lime per acre.
Na = 40 lb. N applied as 200 lb. ammonium sulphate per acre.
P = 80 lb. P_2O_5 applied as 470 lb. superphosphate per acre.
Pt = 80 lb. P_2O_5 applied as 470 lb. Thomas phosphate per acre.

2 [KPN] means double quantities ; ½ [KPN] means half quantities.

All manures applied twice a year—in spring and autumn.

Salt applied, 2 cwt per acre ; *Lime* applied in two dressings of 2 tons per acre.

TABLE III.

ANALYSES OF SOILS FROM MANURIAL EXPERIMENTAL PLOTS ON BUDERIM MOUNTAIN.

Volcanic Dark Red Sandy Loam.

	Soil from adjoining *Virgin Land.*	Average Sample of Soil from Experimental Field Exhausted Land.	Soil from Unmanured Row, No. 15.	Soil from Manured Row, No. 12.
Date of Analysis	13-3-1909	13-3-1909	31-12-1913	31-12-1913
Reaction	Acid.	acid.	sl. acid.	acid.
Water capacity	52·4	46·0	52·7	51·5
Capillarity after 3, 6, 24, and 48 hours	9-12-14½	4-5-9	12½-17-20½-22¾	11-15¼-17-18¾
Mechanical analysis of fine earth—				
Fine gravel, from 1 to 2 mm.	..	1·07	·88	·69
Coarse sand, from ·5 to 1 mm.	..	2·54	4·11	3·59
Medium sand, from ·25 to ·5 mm.	..	26·14	24·23	17·59
Fine sand, from ·05 to ·25 mm.	..		14·38	14·25
Silt, from ·02 to ·05 mm.	..	13·16	7·02	13·14
Fine silt, from ·01 to ·02 mm.	..	3·33	7·26	1·59
Clay, under ·01 mm.	..	28·76	22·05	21·87
Organic matter and water	..	25·00	23·07	27·28
Moisture	6·34	7·96	7·45	8·14
Humus	18·86	17·04	3·62	3·60
Other organic matter and comb. water			11·97	15·28
Nitrogen	·560	·292	·314	·325
Chlorine	..	..	·0075	·0050
Phosphoric acid	·255	·338	·160	·204
Lime	·450	·180	·260	·260
Magnesia	·310	·310	·141	·129
Potash	·109	·067	·085	·127
Insoluble in HCl of 1·1 sp.g.	37·72	31·89	32·22	31·99
Soluble in 1 per cent. citric acid—				
Phosphoric acid	·0142	·0034	·0026	·0046
Lime	..	·0830	·1380	·1510
Potash	·0400	·0035	·0052	·0312

MANURING FRUIT TREES.

For maintaining fruit trees in bearing, in health and vigour, and enabling them to bear heavy crops of fruit, it is essential that they be properly nourished.

In practice, this is generally ensured by applications of fertilisers.

In order to better understand the subject, it is worth the fruit-grower's while to unearth this knowledge himself, in his own orchard.

There are three ingredients which need to be furnished through the medium of fertilisers—namely, potash, phosphoric acid, and nitrogen. The remaining essential plant food constituents are usually present in the soil in abundant quantity, and need not be supplied. Adverting to these three important constituents, it is generally safer, when the fruit-grower is not properly conversant with the tree's requirements on his

particular land, to apply all three. A one-sided manuring is not a profitable manuring, and is not productive of the best results.

In order to ascertain the requirements of fruit trees in his orchard, the fruitgrower is recommended to experiment; in other words, manure certain rows of trees in the orchard with different manurial dressings, and closely observe the results with regard to yield, size, colour, appearance, flavour, and keeping qualities of the fruit produced, and also the appearance, vigour, and disease-resistant properties of the trees, and, not the least important, the profits accruing from their application.

The beginner should remember that potassic fertilisers supply potash; phosphatic fertilisers, phosphoric acid; and nitrogenous fertilisers, nitrogen, respectively.

Examples of potash fertilisers are—

Sulphate of potash, and
Muriate of potash.

Those of phosphatic fertilisers—

Superphosphate,
Basic slag, and
Bonedust,

the last-named also supplying a little nitrogen, while

Sulphate of ammonia and
Nitrate of soda

may be cited as examples of nitrogenous fertilisers.

Supposing a fruitgrower is desirous of ascertaining whether fruit trees on his land will respond to potash, all he need do is to apply a phosphatic and nitrogenous fertiliser to a number of trees and make a note of it. Such a dressing is known as an incomplete fertiliser, as it does not supply all the three important plant food ingredients. To an equal number of trees of the same age, variety, and size, on similar land, he should apply the same amounts of phosphatic and nitrogenous fertiliser, plus, say 1 to 2 lb. sulphate of potash per tree.

Similarly, if a grower desires to find out if it will be profitable to apply phosphatic or nitrogenous fertiliser, he may proceed on similar lines, omitting the particular fertiliser which he needs the information about from the dressing, in one case, be it phosphatic or nitrogenous, and including it in another. In this way the fruitgrower may observe the behaviour of the trees towards the particular kinds of fertilisers.

Fruit crops are unlike most farm crops, in that the effects of the fertilisers are not so readily observable, and the beginner needs to be warned against expecting outstanding results the first season. The second and subsequent seasons, however, good results may follow rational manuring.

Mr. Alfred Thiessen, of Geeveston, Tasmania, laid down experiments on the three-plot system in the spring of 1912 with apple trees. The trees on the No. 1 plot were left unmanured, those on No. 2 received—

3 lb. superphosphate,
2 lb. bonedust,
½ lb. sulphate of ammonia,
1½ lb. sulphate of potash,

per tree, and those on No. 3 received

3 lb. superphosphate,
2 lb. bonedust,
½ lb. sulphate of ammonia.

The yields, calculated per acre, for the first season were:—

Plot 1, 560 cases.
Plot 2, 800 cases.
Plot 3, 666⅔ cases.

The past season's results (being the second year of experiment) were:—

Plot 1, 524½ cases.
Plot 2, 1,022¼ cases.
Plot 3, 915 cases.

The absence of fertiliser on plot 1 accounted for considerably lower yields. The trees on plots 2 and 3 each received the same amounts of superphosphate, bonedust and sulphate of ammonia. Those on plot 2 were given 1½ lb. sulphate of potash in addition.

The difference in yield, and consequently the money value, between the two plots was well marked, and showed that the complete fertiliser was the most profitable one.—"The Fruit World."

BLACK SPOT OF THE MANDARIN.

In view of the prevalence of black spot in certain mandarin orchards in the Gosford district, the Department of Agriculture (N.S.W.) is arranging to carry out extensive experiments to determine the best methods for combating this disease. As a tentative recommendation, pending the results of these experiments, the department advises orchardists having infected trees to severely prune and remove every visible appearance of diseased limbs. As the fungal hyphæ have been traced inside the living tissues, and in this position are immune from the effects of spraying, growers are recommended to take the greatest care to ensure that all infected parts are removed, not hesitating to cut away as much as 4 in. of the live wood below the affected parts. The future shape of the tree as a result of the pruning or the length of time taken in the operation are but secondary consideration. All prunings must be burnt. This work should be begun at once, and continued during the ensuing

two months, before the trees make new growth. Constant examination of the trees is necessary, so that any further development may be detected.

Spraying Mixture.—After pruning, the trees and the ground beneath should be sprayed with a fungicide. Bordeaux mixture is suitable if prepared at the rate of 6 lb. lime, 4 lb. bluestone (sulphate of copper), and 50 gallons of water. Lime-sulphur spray may also be used if mixed at the rate of 53 lb. lime, 100 lb. sulphur, and 50 gallons of water, being then diluted in the proportion of 1 part of the solution to 20 parts water. Three sprayings should be given, the first immediately after pruning, the second just after the fruit has set, and the third a fortnight later. In the second and third spraying the mixture should be diluted; in the case of the Bordeaux mixture 100 gallons water should be used instead of 50, and in the case of the lime-sulphur 1 part of the solution should be added to 28 of water. In explanation of the short interval between the second and third spraying, it might be mentioned that infection of the fruit takes place at a very early stage and, owing to the waxy exterior of the fruit, it is particularly difficult to get it covered with spray at this stage, hence two sprayings within a fortnight are recommended. Later spraying, depending on weather conditions, should take place at intervals until the fruit is half grown. After reaching this stage it appears to be little affected by the fungus.—"Town and Country Journal."

A LARGE GRANADILLA

We have received from Mr. F. Bunney, of Kin Kin, a photograph of a fine granadilla fruit, which, he says, weighed exactly 7 lb. Its length was 10¾ in., and circumference 22 in. This fruit was grown on a twelve months' old vine on which there were about twenty more ranging from 5 to 6 lb. each. Mr. Bunney, doubtless, is located on splendid soil, suitable not only for fruit but also for fodder grass, as his paspalum grew to a height of 10 ft. 6 in., one stool measuring 11 ft. 4 in., whilst Rhodes grass ran to 8 ft. 6 in. and white panicum to 6 ft. from the ground upon uncultivated scrub land, burnt off last December. We regret that the photograph is quite too dark to reproduce, but we shall be pleased to reproduce a clearer copy if one can be obtained.

THE ALGAROBA BEAN.

Some misapprehension appears to exist as to the nature of the Algaroba or Mesquit Bean, and we have been asked whether the bean should be grown on a trellis, although we have already described the Algaroba in previous issues of the Journal. The bean is the product of a large tree which grows to a height of 40 feet. We now give an illustration of the tree, which should be sufficient to show that the plant has nothing to do with climbing beans. (See May issue of the Journal, 1914.)

Plate 41.—The Algaroba Bean.

PROFITS IN PEANUTS.

Mr. Bunbury (the Peanut King) of Ballendella, Vic. (writes the "Producers' Agency") estimates that as much as £350 per acre profit may be earned by growing peanuts. The wholesale price of these nuts averages 6½d. per lb., and despite importations from Japan, the demands of the Australian markets are not properly filled. Bunbury says that he has disposed of some of the crop he obtained this year (his first experience) at 1s. per lb., and thinks that even with the nuts down to 1d. per lb., the grower can make a profit of £27 per acre.

Tropical Industries.

SUGAR FROM THE NIPA PALM.

Attention has been drawn in these pages to the commercial possibilities of Nipa Palm (*Nipa fructians*) which covers large areas of swamp land in various parts of the tropics. The palm is found widely in Burma, Lower Bengal, the Andamans, Chittagong and Ceylon, and Papua. The requirements for its growth and proper development are said to be few, consisting of low river land subject to periodic overflow by brackish tide water. Large areas of this character, covered almost exclusively with the nipa palm, exist in several provinces of the Philippine Islands. The determination of the Philippine Government to place the manufacture of native drinks, alcohol and spirits generally, upon a revenue basis led to some investigation into the merits of this palm from an industrial standpoint. The Bureau of Science at Manila, which took up the investigation, published in 1911 two important reports covering the results of their researches. The reports, which were summarised in the "Indian Trade Journal" of 11th April, 1912, went to show that the cost of producing alcohol from the nipa palm was 2·7 cents gold per litre (1·05 quarts) as compared with 5·8 cents per litre for alcohol from sugar beets at $5 per ton; 5 cents for alcohol from sugar-cane at $3·25 per ton; 3·4 cents from cassava at $5 per ton; 6·6 cents from maize at 70 cents per 56-lb. bushel, and similar cost from other sources.

A recent issue of the "Philippine Journal of Science" publishes the results of further investigations into the possibilities of the nipa palm as a commercial source of sugar. A brief summary of the results will probably be of interest to readers who have followed the earlier investigations. It is shown that, in the Philippines, nipa palms produce about 40 litres (8·8 gallons) of sap per tree during an average season. A conservative estimate of producing palms may be placed at 750 per hectare (304 per acre), yielding 30,000 litres (6,600 gallons) of juice. The nipa district in the Provinces of Bulacan and Pampanga alone is estimated to contain 18,000 hectares (44,460 acres), and many other large areas in various islands are available for sugar manufacture.

The average season during which sap is available in sufficient quantities to supply a sugar-mill covers approximately six months. The daily collections reach a maximum during the second month, and gradually diminish after the third or fourth month.

The average nipa sap as it flows from the palm during the season contains about 15 per cent. sucrose, and has an apparent purity of not less than 85. Invert sugar is present only in traces. About 0·5 per cent. of sodium chloride slightly reduces the purity without lowering the extraction of sugar, as it is classed among the nonmelassigenic salts. Waxes, acids, pectins, and other foreign material are practically absent. The sap contains active enzymes of the invertase and peroxidase types,

the latter being present only during the final period of secretion. This peroxidase is capable of oxidizing sucrose and invert sugar in either neutral or alkaline solution.

Nipa sap may be collected without appreciable deterioration in bamboo joints or tuquils containing lime cream and sulphite. The latter may be added to the lime at the mill by passing the requisite amount of sulphur dioxide into a lime cream of proper consistency. The presence of this additional preservative in the lime cream will destroy the enzymes present and prevent deterioration of the sap. It also avoids the necessity of further bleaching. The use of small funnels for conveying the inflowing juice to the bottom of the tuquils avoids stratification and results in more perfect preservation. The additional expense attendant upon their use is slight, and more than counterbalanced by the resulting advantages.

Nipa sap can be collected and delivered to a mill on a commercial scale with negligible loss of sucrose and decrease in purity for approximately 3 pesos (1·50 dollars United States currency) per 1,000 litres (220 gallons).

Approximately 115 kilograms (253 lb.) of commercial white sugar polarising at from 99 degrees to 99·5 degrees can be recovered from 1,000 litres (220 gallons) of sap possessing average composition. In the opinion of those who conducted the investigations no important modification of methods now used in sugar practice will be necessary. Furthermore, no expense corresponding to the grinding of cane or the extraction of beets need be included in the cost of manufacture. The lack of fuel caused by absence of bagasse may be largely overcome by utilising the cheap and plentiful wood of mangrove swamps. Manufacturing sugar from nipa sap will be less expensive than from cane or sugar beet.

About 9,000 litres (1,980 gallons) of nipa sap will be required to produce 1 metric ton of 96 degree sugar; therefore, a 10-ton mill running at full capacity will necessitate 90,000 litres (19,800 gallons) of sap daily. One hectare (2·47 acres) of nipa swamp yielding 30,000 litres (6,600 gallons) of juice per season should produce from 200 to 250 litres (44 to 55 gallons) per day during the months of maximum flow. Therefore, about 450 hectares (1,111·5 acres) of good producing swamp would supply such a mill operating at full capacity during the height of the season. Many distilleries at the present time are receiving a larger volume of juice per day than is required in this estimate. Some of the factors concerning the yield of sap per hectare and the cost of production cannot be accurately determined, but, it is remarked, that this phase of the problem has been investigated as thoroughly as possible, and ample margins of safety have been allowed in every case. A mill designed to manufacture sugar from nipa juice will also be available during that portion of the year when no sap is flowing for refining Philippine sugars, in which there is a reasonable profit.

In conclusion the report states that a further study of the various enzymes present in the nipa palm is in progress to determine, if possible, the exact nature and action of the one responsible for the destruction of sugar.—"Indian Trade Journal."

COCKRELL CANE HARVESTER.

The General Superintendent of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following letter from the Cockrell Manufacturing Co., Ltd., concerning a sugar-cane harvester, of which particulars have been given in "The Australian Sugar Journal" from time to time. In May, 1913, p. 102, vol. v., we printed the report of the committee appointed by the Louisiana Sugar Planters' Association, to deal with this subject. At p. 603 of the same volume will be found a further reference; also at p. 145 of the present volume (May issue). It need scarcely be said that at the present juncture, if such a machine could be adapted to our Queensland conditions, it would solve a very disturbing problem which we have now to face, in the high daily wage fixed for cane-cutting.

This company, which is now engaged in the manufacture of a number of sugar-cane harvesting machines for operation in Louisiana during the next grinding season (beginning in October), is investigating the plantation field conditions in every sugar-cane growing country in the world. This is with the idea of facilitating as rapidly as possible the general introduction of our machines. You may have heard that the Cockrell cane harvester has, after a period of eleven years experimentation, been perfected by F. M. Cockrell, junr., president of this company. It will cut, strip, and top the cane ready for the mill better than it can be done by hand, and will do the work of from 100 to 150 men per day. It is equipped with a form of traction which enables it to operate rapidly over the heaviest of land.

The work of developing the machine has been carried on in Louisiana alone, and, therefore, is primarily adapted to field conditions there. In the event that you may not be familiar with Louisiana field conditions, and in order that you may know the conditions under which our machine has been perfected, and that you may see what we had in mind when we wrote the enclosed list of questions, I herewith give a short description of Louisiana field conditions:—The cane is practically all grown immediately adjacent to or in the general vicinity of the watercourses, and the land is almost perfectly flat, though with a slight inclination from the rivers, and towards the swamps; the drainage ditches run from the watercourses back to the drainage canal along the edge of the swamps, and are from 100 to 150 ft. apart. It is on the drainage canal that the pumping station is located, which lifts the surplus water over the low level that separates the drained land from the swamp. The cane rows invariably run parallel to these drainage ditches, and at right angles to these ditches, and crossing them by culvert bridges are roadways or headlands, a distance of from 600 to 1,000 ft. apart. Thus, the cane is divided off into parallelograms or "cuts" bounded on the long side by the ditches, and on the short side by the roadways or headlands. The Cockrell harvester cuts one row of cane at a time by straddling the row, and the longer the run it can make without turning the more rapidly the work can be done. Therefore, it is not advantageous to stop and turn it after it has run down the row of one "cut," but it is desirable that the machine, after running down the row of one "cut," be able to

cross the headland into the next "cut," and the next, and so on, until it reaches the end of the field or plantation. It is important, therefore, from the standpoint of harvesting with the Cockrell harvester, to understand the lay of the ditches in the canefields, whether these ditches are for the purpose of drainage or irrigation.

In Louisiana, the cane rows are 6 ft. apart, from which it follows that the middles between the rows, in which the traction of our machine moves, are 6 ft. from centre to centre. The traction of the machine is aranged for cutting cane rows 6 ft. apart, but it is readily susceptible to a different arrangement where the rows are of different width. The cane rows are hilled up from 10 to 16 in.

Our machine will harvest sugar-cane properly wherever it is cultivated in fields clear of stumps or fallen timbers; planted in rows and hilled up sufficiently to give it an approximately erect habit of growing. Though we would send a representative to Australia to make a personal investigation of conditions on the plantations there before we would consider shipping any of our machines to that field, nevertheless, the information that we now ask for is for preliminary guidance, and also for those who are investing their money in our enterprise. For instance, we wish to supply these investors with undeniable proofs of the need of a mechanical cane harvester in Australia, if that need actually exists. To this end, we are also seeking to ascertain as accurately as possible the labour conditions with which the planters there are confronted. I am enclosing herewith an editorial which appeared in the issue of 24th January of the "Louisiana Planter's Magazine," published at New Orleans, and which accurately states the situation with regard to the Cockrell harvester, with the exception that for the present the machines are being manufactured in Louisville, and not in New Orleans.

The following is the article from the "Louisiana Planter," to which reference is made in the above communication:—

"Announcement has been made that the Cockrell Harvesting Company, of which Mr. F. M. Cockrell, junr., the inventor, is president, is now making its plans to put out a number of sugar-cane harvesting machines next fall, patterned after the machine which was so successfully demonstrated on Reserve Plantation early this month. These machines will in all probability be manufactured in New Orleans, and be ready for operation the first of October. Between 1st October and the opening of the grinding season they will be tuned up and prepared for regular harvesting service.

"Mr. Cockrell claims that each machine will cut, top, and strip somewhere in the neighbourhood of 300 tons of cane a day, and from the impressive manner in which the demonstrations were made at Reserve, this does not seem to be an excessive estimate upon its ability. The company will run the machines with its own skilled operatives, and the planters who secure their services will be charged at a tonnage rate for the cane cut. A comparatively small number will be put out for the season of 1914, both because of the short time in which to make them,

and because this plan is the best one to secure the introduction of the machines under proper conditions.

"Now that so much serious consideration is being given to the question of economy in production, the planters will be delighted to hear of the vigorous, progressive policy with which Mr. Cockrell and his associates have taken hold of the development of this enterprise, the immediate success of which is of such vital concern to the entire sugar industry of Louisiana.

"The observations of the machine's work at Reserve were recorded in last week's issue of 'The Planter,' and this policy of the Cockrell Harvesting Company seems fully justified by the work done by the machine. Any mechanical harvester that will do the work properly is bound to be a very great benefit to the planters, and it is peculiarly fortunate that the perfection of this machine comes just at this time, when economies in its every branch mean so much to the sugar industry.

"It is Northern capital exclusively that is going into the development of this enterprise. Mr. Cockrell has secured this backing because it was evident to him, as it is to all of us, that the planters themselves, in spite of the importance of this invention to them, are in no condition to extend financial assistance because of the bad seasons through which they have just passed. Furthermore, several efforts to invent cane harvesters have failed during the past eight or ten years, and this has made moneyed men of this section sceptical of the whole matter; so that even though inventive genius is now on the verge of commercial success, their attitude of conservation is not at all surprising. Mr. Cockrell informs us that on account of this attitude there has been no effort to secure support for his company hereabout."

SOME PRODUCTS OF THE BANANA.

The drying of bananas for the production of "Banana Figs" was described in the July issue of the "Journal." There are other products of the fruit, such as "Banana Flour," but for this, drying machinery is needed. Briefly, the flour is made from the fully-grown, unripe fruit: that is, before the starch is changed into sugar in the ripening. It is difficult to peel green bananas, but if they are first put into scalding water (176 deg. F.) for four or five minutes, the peel is easily removed. The peeled fruit is dried in the sun, or put into a drying machine of some kind to reduce the percentage of water which it contains (70 per cent.) to 15 per cent. The bananas to be sun-dried are cut, after peeling, into thin slices, and laid out in the sun. One day's hot sun is sufficient to dry them, after which they are put into a mortar, pounded, and sifted. Two ordinary bunches will make ten quarts of flour. The flour is about equal to rice in nutritious value. It is difficult to make banana bread unless the flour is mixed with a large proportion of wheat flour.

Other products of the banana are, wine, whiskey, and alcohol. W. Fawcett, in his excellent work on the banana, and its commercial uses, says that in all exporting countries there are probably as many as

8,000,000 bunches that annually fail to come up to the high standard rightly insisted upon by the shippers. Those 8,000,000 bunches, at 6d. each, amount to £200,000 per annum. Various attempts have been made from time to time to make use of this fruit and avoid the loss. It had already been demonstrated very many years ago that bananas can be made into flour, or dried like figs, or utilised in making alcohol, and the knowledge has been, to some extent, turned to account in the present day.

Banana Wine.—Consideration has already been given to the preparation of flour and banana figs, but only a small proportion can be utilised in this way, and it remains to consider the use of bananas in manufacturing an alcoholic spirit. It is well known that an excellent fermented drink can be made from bananas and plantains. Ligon (1657), Dampier ("Voyages"), Speke (Central Africa), Stanley ("Darkest Africa"), Dr. Parke, and other travellers have described the native process of making banana wine as follows:—"The natives take ten or twelve ripe plantains and wash them well in a trough; then they place them in two gallons of water. In two hours' time this will ferment and froth like wort, and in four hours it is fit to drink. It will not, however, keep for more than 24 or 30 hours, so it is brewed every morning." Dampier says that it drinks brisk and cool, and is very pleasant. Dr. Parke says it is a most delicious drink.

Banana Spirit.—The possibility of utilising the fruit in the production of alcohol has, more than once, been under the consideration of the Academy of Sciences of France, and it was shown that during the whole growth of this fruit the saccharine matter is constituted entirely of cane-sugar, but the proportion varies considerably. Analysis by M. B. Corenwinde showed that a sound, ripe banana fruit contains as much as 22 per cent. of sugar, 16 per cent. being crystallisable and the remainder uncrystallisable. In a sugar-cane the proportion of cane-sugar present is about 18 per cent. It was hence concluded that the banana might produce an excellent alcohol.

Banana Whisky.—At the Central Laboratory of Guatemala, experiments were conducted which led to the production of a good spirit, something like whisky, from bananas which were about to be thrown away. Samples of this spirit were sent to the St. Louis Exposition that had only been six months in barrel. They were recognised as of superior quality, and after analysis by the Department of Agriculture, Washington, the producers were awarded a gold medal. Alcohol ages so rapidly in tropical countries, that one year in barrel is sufficient to make the product very fine. Corn whisky must be kept in casks for several years before being offered for consumption, and at least five years to obtain the best qualities. Banana whisky is ripe at the end of one year. The cost of manufacture is said to be much less than that of ordinary whisky. The yield may be estimated at about 1 gallon per bunch of bananas.

A memorandum of expenses made for a plant capable of producing 150 casks of whisky daily, aggregated 827,000 francs (about £34,458). This

estimate included buildings, machinery, apparatus, fuel, labour, administration, general expenses for two years, cases, bottles for one year, and raw material for manufacture for two years, 270,000 bunches at 75 centimes (7½d.) each.

COIR FIBRE.

We have on several occasions pointed out that hundreds, possibly thousands, of tons of valuable fibre are allowed to rot in heaps in many of the British Colonies, and we instanced the enormous quantity of coconut husks which are allowed to go to waste in Papua, where copra is produced in several districts on the coast. Coir fibre is extensively

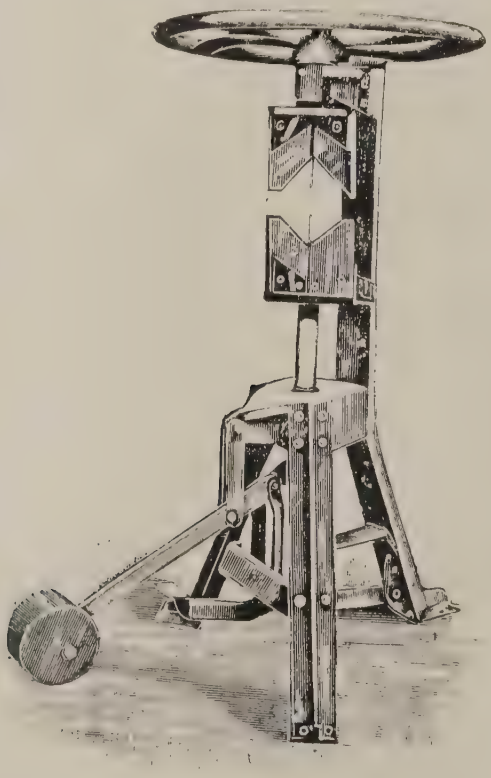

PLATE 42.

used for cordage, stair carpets, matting, bristles for brushes, brooms, &c., and when cleaned and curled, it is largely used by upholsterers for stuffing mattresses, &c. The quantity of fibre contained in a husk varies very much according to climate, season, and place of growth. In Ceylon, forty coconuts are said to yield 6 lb. of coir fibre. Three large nuts will yield 1 lb. of fibre, whereas ten small island nuts only yield about 1 lb. It is ordinarily assumed that, on an average 1,000 nuts will yield 140 to 160 lb. of fibre. Say it takes 5,000 nuts to produce 1 ton of copra: This means that from 700 to 800 lb. of fibre are wasted

in many copra-producing countries for every ton of copra produced. As clean coir is worth £18 to £20 per ton in the market, this represents a loss, less expenses of preparation, of between £6 and £7 for fibre now going to waste. In order to remove the husk from the nut, an iron spike is fixed in the ground; the nut is forced upon its point which passes through the fibres, and separates the husk from the shell. But this primitive native method, by which a man can clean about 500 nuts in a long day, has been improved upon by the invention of a machine which quickly removes the husk and enables the operator to clean 100 nuts an hour with very slight personal exertion. The machine was described in the May issue of the "Journal," 1913. The illustration shows the simplicity of the machine.

After husking, the husks are soaked in water for about six months, after which they are rolled in a crushing mill. Then they undergo the process of extracting the fibre from the husk by means of another machine called "The Extractor." Then the fibre is dried, passed over small combs or hackles to straighten it, and finally packed in bales for market. This coarse fibre, which is used for brush-making, is passed for finer work through other machines, which free it from "shorts," "hards," and other extraneous matter. Thus cleaned, it is ready for the spinning machine for the making of rope, &c. The husking machine costs in Europe about £13.

THE REVIVAL OF SYNTHETIC RUBBER.

The following interesting remarks on the claims of the latest synthetic rubber appears in "Truth," and will no doubt be appreciated by our readers:—

"It is nearly two years since we had a synthetic scare. During the past two months the market has been threatened by a new process. Inquiry with regard to it in quarters well informed in all that relates to the chemistry of rubber showed that the newcomer was held in no better esteem than its predecessors. Samples of the material are now on view, and it is stated that an attempt is shortly to be made to raise money from the public. According to market gossip the new material is made from cotton, nitric acid, and artichokes. So wonderfully does the product of these substances resemble fine hard Para that the cleverest rubber chemists—men who are testing and analysing rubber every day of their lives—cannot distinguish it from the Brazilian product. At least, this is the statement as dished up for public consumption by the provincial newspapers; but the mere extravagance of the claim is sufficient to exclude it from notice in the recognised technical journals. Fine hard Para has a number of characteristic impurities which readily enable the chemist to distinguish it from plantation rubber. Not only does the new process supply pure rubber, but all the characteristic impurities, it seems, are also synthetically reproduced in so life-like a form as to deceive the expert. It is necessary only to remark at present that the opinion of the chemist who cannot recognise fine hard Para by

its impurities is not worth having, and I shall require testimony of a far more convincing character before I proceed to discuss the merits of the synthetic compound as a possible competitor with the natural product."

A sample of synthetic rubber produced in Manchester has found its way to Ceylon, a Fort broker being the recipient. It has gone the round of the firms, and would probably have come in for more consideration had not one merchant cast doubts upon its genuineness. He had it subjected to a test, he said. He burnt a piece of the so-called synthetic rubber and a similar-sized piece of rubber taken from his stock-room. The residue left by each piece was exactly the same in substance, smell, and every other particular. While the matter rests at this at present, the Government Chemist is waiting the arrival of a bigger sample, which is understood to be coming out.—"Grenier's Rubber News."

PERENNIAL RICE.

BY C. E. WOOD, Manager, Kamerunga State Nursery.

In the February (1912) number of the "Philippine Agricultural Review" mention is made of the discovery of a perennial rice in Senegal, French West Africa. Considering that a rice of this nature would be a great acquisition for permanent pastures in the tropics, application was made, and the Department of Agriculture, through our Agent-General in London, procured a small parcel of seed, which was sown at the Kamerunga State Nursery. Unfortunately only one seed germinated, but, being in a pot, it was possible to give it every attention; all the other seed, whether planted in the open or in pots, failed to germinate. In January last this plant, having some three or four shoots, was put in the open ground.

The accompanying photograph A, taken in May, shows the progress made as regards height, while B gives a very clear idea as to how the plant spreads. C shows the root system, and how, by means of its creeping underground stems, the plant is enabled to spread.

In December, 1913, another parcel of seed was received, part of which was planted out in January in the open, having first been treated with a 2 per cent. solution of liver of sulphur, in case of rust. The germination of this lot was fairly good, and photograph D shows what the growth was like at the end of May, when the rice was in flower.

For testing the palatableness of this crop as a fodder, a handful or two was cut and given, first to a cow and then to a horse, both of which ate it readily; this was done just before the flowering stage. Latterly, the seeding being over, and the leaf-blades turning yellow, the crop is being cut and fed to a cow. Not only does she eat it readily, but evidently prefers it to Rhodes grass, as I tried first giving a small bundle of Rhodes before the rice; she at once left the Rhodes and finished the rice.

With regard to the nutriment value of this fodder, a small sample was sent to Mr. Brünnich, the Agricultural Chemist, for analysis, and the result was fairly satisfactory, as Mr. Brünnich classes it as "a hay

Plate 43.—(A), Showing Height of Plant (Four Feet).

of very fair quality almost equal to Rhodes grass hay." From this it will be seen that the perennial rice can be classed amongst our good fodder plants. Other points—such as probable weight of green feed

Plate 44.—(B), Showing Spread of Plant in Four Months.

per acre, lasting powers of crop, and rate of growth after being cut or fed off—have yet to be determined. A weak point which should be mentioned is the very small quantity of seed produced, the panicles,

PLATE 45.—(C), ROOT SYSTEM WITH UNDERGROUND STEMS.

compared with the number of plants, being few, and from a single panicle, as shown in photograph E, two to ten seed only ripened, while many had no seed, all the glumes being empty.

PLATE 46.—(D), PERENNIAL RICE IN FLOWER.

Since this rice came to maturity, brown markings or spots have appeared on the leaf-blades, giving it rather a dirty appearance; and, to prove whether this is a form of rust which may prove harmful,

samples have been sent down to the Government Plant Pathologist. In conclusion, I would say that, while this new fodder is neither likely nor expected to be substituted for any of our good grasses, it should prove a welcome addition, being both nourishing and palatable. With regard to the seed, I have already mentioned that it is scarce; it also is a long-bearded rice, the grain being very lean and not likely to be of any use for human consumption in its present form.

Plate 47.—(E), Panicle of Perennial Rice.

HINTS TO INTENDING BEEKEEPERS.

In reply to a correspondent, Mr. G. Butler, hon. secretary to the Queensland Beekeepers' Association, kindly writes:—"The local knowledge necessary as to the suitability of a district for beekeeping is to make a careful note of the various trees in close proximity to the location in which it is desired to establish an apiary. If ironbark, blue and grey gum, box, and apple trees abound in great quantities it is quite safe to commence operations in that locality. Districts where lucerne is grown extensively produce honey of a good quality; it being light in colour is much favoured by the consumer. Bloodwood yields a honey of good density, but is somewhat dark in colour. Should more than one person wish to begin beekeeping it is not advisable to place apiaries too close together. At least 2 miles should separate one from the other, or the yields of honey will be considerably curtailed. If the knowledge of beekeeping is limited, the beginner should commence in a small way, and gradually acquire a knowledge of the habits of bees. As a subsidiary occupation to farming it is often a standby when other crops fail through climatic influences. Given a good genial winter it does not matter how dry the summer may be, the yield of honey will be bountiful."

Botany.

ELEUSINE INDICA (CROWFOOT GRASS)—A GRASS DANGEROUS TO STOCK.

BY FRANK SMITH, B.Sc., F.I.C., AND C. T. WHITE.

The writers, in the course of an inquiry into the distribution of hydrocyanic acid containing compounds in the Queensland flora, a question of some importance, apart from its interest in plant physiology, in the field of stock-toxicology, have observed the occurrence of these compounds in certain of the grasses, among them *Eleusine indica* (Crowfoot), which apparently contained some quantity.

No originality is claimed for this observation, as Dr. J. M. Petrie had previously, in a comprehensive paper recently published in the Proceedings of the Linnean Society of New South Wales, dealt with the grasses of that State from this aspect, and their occurrence in *Eleusine* has been noticed elsewhere. The present brief notice, however, seems justified in view of the common occurrence of *Eleusine indica*, and that the possession of poisonous properties by a grass usually considered a fodder of some value has not hitherto been generally recognised.

Eleusine indica is a strong-growing succulent summer grass widely distributed in the tropical and sub-tropical countries of the Old World and introduced into the warmer parts of America. In Queensland it is found throughout the length and breadth of the State, mostly, however, in coastal localities. It is usually found in rich moist land, and is especially common in and around cultivation areas, waysides, &c. It is a common weed in gardens and backyards. Most stockmen are familiar with the poisonous property of immature sorghum, due to its content of a cyanogenetic glucoside (dhurrin), which in consumption is broken up, yielding the exceedingly toxic hydrocyanic acid. *Eleusine indica* must be considered to contain a similar substance. An estimation of the amount of hydrocyanic acid yielded by maceration of the fresh cut grass with water and distillation, in June of the present year, showed ·92 grains per pound, an amount equal to that in sorghum at a certain stage of growth, and in sweet potato vines, producing poisoning in pigs. It is probable that the amount of hydrocyanic acid present would be found higher under the conditions of more vigorous growth obtaining in the summer months.

The production of toxic symptoms in animals grazing cyanogenetic plants will depend upon the rate of liberation of the acid in the digestive tract, the rate being itself dependent on a variety of conditions—the amount consumed, the composition of the food with regard to its fibrous and saccharine constituents, and the condition of the digestive secretum. We have no doubt, however, that *Eleusine indica* can produce poisoning in animals feeding it, and cases of sickness in horses having access to

Plate 48.—Eleusine indica, *Gaertn.* Crowfoot Grass.
A.—Spikelet. B.—Grain. (Enlarged.)

patches of this grass in cultivated land and sudden mortality of poultry on runs infested with it, which have come under our notice, are attributable to this cause.

A brief botanical description of *Eleusine indica* is appended:—

Eleusine indica, Gaertn (Crowfoot Grass). A strong growing tufted annual grass from 1 to 2 ft. high. Leaves narrow, numerous; sheaths flattened, distichous, ciliate, with a few long hairs; ligula membranous. Spikes 2 to 7, 2 to 4 inches long, straight, digitate, with usually one or two, rarely more, inserted rather lower down. Rhachis smooth, prominent on the upper or inner side; spikelets loosely imbricate on the opposite side; 3-6 flowered. Glumes rather obtuse (oblong-lanceolate in profile). Pericarp persistent, membranous, enclosing the dark-coloured rugose seed.

THE NET FUNGUS.

Our illustration, reproduced from a photograph received from Mr. A. Howarth, Philpott Creek, Gayndah district, shows the peculiar net-like formation of the Net Fungus, *Clathrus cibarius*. In the young, or "egg" stage, it resembles a puff-ball, at which period of its existence it is said by some to be edible, hence the word "cibarius," meaning "relating to food" or edible.

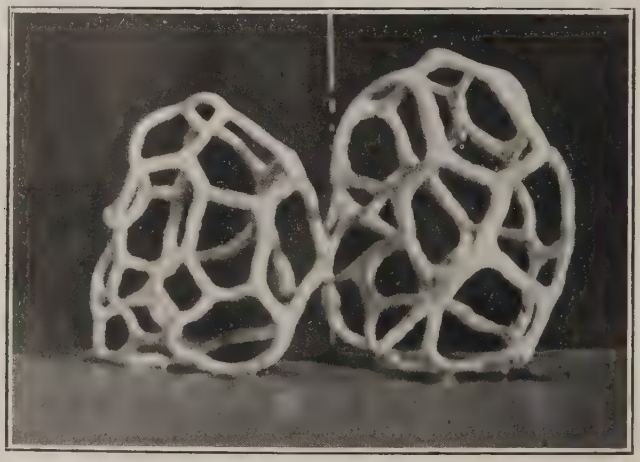

PLATE 49.—NET FUNGUS.

THE MARBURG AND DISTRICT AGRICULTURAL AND INDUSTRIAL ASSOCIATION.

As showing the interest taken in agriculture by the above association, it is worthy of note that more than two-thirds of the prize-money in connection with the association's show in June last was allotted to Agriculture and Horticulture.

Horticulture.

CULTURAL DIRECTIONS FOR THE PAPAYA.

(From the "Philippine Agricultural Review.")

By P. J. WESTER, Horticulturist in Charge of Lamao Experiment Station.

Preliminary remarks.—The papaya is one of the commonest fruits in the Philippines, ranking next to the banana with respect to wide distribution, largely because of its rapidity of growth and early fruiting habit as compared with other fruits.

The papaya is a large succulent herb, of exceedingly rapid growth, and when well cared for produces ripe fruit within twelve months from the planting of the seed. It is very impatient of water standing around the roots and succeeds on well-drained land, sandy or loamy soils being most suitable; as it is easily injured by strong winds the papaya should be planted in well-sheltered situations.

From the grower's point of view there are three kinds of papayas: The hermaphrodite papaya, the flowers of which are perfect; the pistillate, or, as it is commonly called, the female papaya; and the staminate, or male, papaya. Of the two fruiting kinds, the hermaphrodite is preferable to the female since it is usually sweeter and better flavoured; a very great point in its favour is the fact that it is more apt to reproduce itself true to seed than the female.

The hermaphrodite papaya is distinguished by its more or less oblong or pear-shaped form, sometimes, in its best types, approaching the shape of a cucumber. The female papaya is recognised by its more roundish shape, prominent "nose," and a large seed cavity that frequently is filled with seed.

Propagation.—The seed bed should be prepared by thoroughly pulverising the soil by spading or hoeing the ground well and clearing away all weeds and trash. The seed should be sowed thinly, about 1 to 2 centimeters apart, and covered not more than 1 centimeter deep with soil, and the bed then watered thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, for example, under a tree; or, it may be shaded by the erection of a small bamboo frame covered with grass or palm leaves. If the seed is sown during the rainy season a shed should always be put up over the seed bed to protect the seed from being washed away and the plants from being beaten down by the rains.

Transplanting the seedlings in the seed bed, setting them about 7 to 10 centimeters apart, when two or three true leaves have appeared, will very materially aid in the successful transfer of the seedlings to the field.

Transplanting to the field.—When the plants have attained a height of about 7 to 10 centimeters, they are ready for transplanting to their permanent place in the garden or the orchard.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leaf blades should be trimmed off.

In transplanting, take up the plants with a large ball of earth so that as few roots as possible are cut or disturbed. Do not set the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant to hold water, and then give it a liberal watering.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. Unless the seed is of an unusually good strain it is also a good plan to set out two or three plants to each "hill." This gives the grower a better opportunity to discard male and undesirable female plants without destroying the "stand," than if only one plant is set out in each place.

If the plants can not be set out in the field at the time indicated, transplant them from the seed bed to the nursery, setting the plants 30 to 40 centimeters apart in rows 1·2 meters apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters tall, the plants may be transplanted from the nursery to the field with safety even after having attained a height of 2 meters (6 ft. 6 in.), *provided that all except the young and tender leaf blades are removed, leaving the entire petiole or leafstalk attached to the plant*, as shown in figure 1, and provided that, in those regions where the rains are excessive during the wet season, the work is performed during the dry season. If the entire leafstalk is left on the plant it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the leafstalk into the stem of the plant. As the tissue of the papaya plant is exceptionally favourable for the rapid development and spread of fungi, if the leafstalk is cut off *close to the stem* as shown in figure 2, the fungi invade the stem from the remaining short petioles and the plant dies.

Papayas should be planted 4 meters (about 13 ft.) apart each way on land of average fertility; on very rich land it may be desirable to set out the plants 4·5 meters apart.

Culture.—While the plants are small the intervening space may be planted to some upright-growing cover crop, such as mongos or cowpeas, but when the papayas come into fruiting the best plan is to keep the land clean cultivated during the dry season. For the best success it is essential that the plants are irrigated whenever the leaves show signs of wilting, and being of exceedingly rapid growth the papaya requires more water than most plants. In order to reduce evaporation and irrigation expense, the land should be cultivated as soon as it is in condition for cultivation after the flooding. The harrowing may be repeated once or twice before the field is again irrigated.

During the rainy season special attention should be given to see that there is no stagnant water in any part of the papaya plantation, and that all surface water drains off rapidly.

Plate 50 (Fig. 1).—The Correct Way of Pruning a Papaya Plant before Transplanting.

PLATE 51 (FIG. 2).—THE INCORRECT WAY OF PRUNING A PAPAYA PLANT BEFORE TRANSPLANTING.

Plate 52 (Fig. 3).—Stump of old Plant a few weeks after "Decapitation."

Rejuvenation of old plants.—When a plant has grown so tall that it is difficult to gather the fruit, which also at this stage grows small, cut off the trunk about 0·75 to 1 meter (3 ft. 3 in.) above the ground. A number of buds will sprout from the stump (figure 3), and in a surprisingly short time the old stump will have been transformed into a papaya plant in full bearing. These sprouts, except two or three, should be cut off, for if all are permitted to grow the fruit produced will be undersized.

Seed selection.—Seed should be saved from the best fruits only. By this is meant not so much a large fruit as one that is *sweet and well flavoured*, with a small seed cavity and few seeds. Oblong should be preferred to round fruits in saving seed, since they grow on plants having both stamens and pistils in the same flower, and these being very largely self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from round or melon-shaped fruits, which grow mostly on female plants.

All male plants should be promptly destroyed wherever they appear, as not only are they unproductive, but by their pollen being carried to others which are fruiting they tend to produce degenerate plants when these are grown from the seed obtained from plants growing in the vicinity of the male plants. There is no need to fear that the others will not fruit if the male plants are destroyed, for the reason that there are always plants near by having *perfect* flowers which provide sufficient pollen for the pollination of the females.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·4	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·31
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·32
31	6·29	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

		H.	M	
3 May	☾ First Quarter	4	29	p.m.
10 „	○ Full Moon	7	31	a.m.
17 „	☽ Last Quarter	8	12	„
25 „	● New Moon	12	35	p.m.
2 June	☾ First Quarter	12	3	a.m.
8 „	○ Full Moon	3	18	p.m.
16 „	☽ Last Quarter	12	20	a.m.
24 „	● New Moon	1	33	„
1 July	☾ First Quarter	5	24	a.m.
8 „	○ Full Moon	12	0	„
15 „	☽ Last Quarter	5	32	p.m.
23 „	● New Moon	12	38	„
30 „	☾ First Quarter	9	51	a.m.
6 Aug.	○ Full Moon	10	41	a.m.
14 „	☽ Last Quarter	10	56	„
21 „	● New Moon	10	26	p.m.
28 „	☾ First Quarter	2	52	„

General Notes.

THE BOLL WORM AND THE "BOB WHITE" QUAIL.

"The Englishman" (Calcutta), commenting on Mr. Harcourt's endeavour to breed the "Bob White" quail in England, says:—"Mr. Lewis Harcourt, the Colonial Secretary, is conducting an interesting experiment at his home at Nuneham Park, Oxfordshire, with a view to keeping under, if not destroying, the boll weevil, the greatest pest of the cotton cultivator. In the United States the boll weevil has been kept in check by the 'Bob White' quail. Last summer Mr. Harcourt, by the courtesy of the American Zoological Society, obtained a number of these birds in the hope that they would breed at Nuneham, so that he might supply them to our cotton-growing colonies. Many previous attempts to introduce the bird into England have proved unsuccessful. Mr. Harcourt obtained the birds too late in the season for them to breed last year, but is hoping for results this year. The idea of breeding the 'Bob White' quail in England is Mr. Harcourt's own, and is being watched hopefully by all interested in cotton. The 'Bob White' is a wary denizen of open woods and pastures, and it has been successfully introduced into the West Indies."—"Rubber World."

[In reference to the above, we may observe that "boll worm" and the "boll weevil" are quite distinct. The latter is the pest which has caused such havoc in the United States. The boll-worm we have in Queensland. It is the same worm which attacks maize, but in neither case is it much in evidence, and in cotton fields it is easily got rid of by means of trap crops of maize interspersed with the cotton plants. Still, if the bird mentioned could be imported and acclimatised in Queensland, it might prove useful in the case of the boll worm in maize fields.—Editor "Q.A.J."]

NATIVE BIRDS PROTECTION ACTS.

DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf eating birds, no objection could be raised towards their sacrificing

thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise morepork), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that " About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs, &c." Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it: —

INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

Ibis.—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

Carrion Crow.—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs, and large insects generally. Ticks, rats and mice, eggs of poultry and

wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

Pied Crow (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

Morepork (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Dacelo sp.* (Brennan).

Night-jar.—On various nocturnal flying insects, and especially on moths.

Laughing Jackass.—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

Kingfishers (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

Kingfishers (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

Butcher Birds (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chicken, hive bees (exceptionally).

Dollar Birds.—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds are published for general information.

BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

SCHEDULE A.

Common Name.	Technical Designation.
Australian Bee-eaters	Merops
Babblers	Timeliidæ
Bell Birds	Oreoica
Bitterns	Ardeiformes
Black Cockatoos of all species	Calyptorhynchus
Black Swans	Anatidæ
Bower Birds of all species	Ptilonorhynchidæ
Bush Chats of all species	Ephthianurinæ
Cassowaries	Casuariidæ
Caterpillar-eaters	Campophagidæ
Coachwhip Birds	Timeliidæ
Coucals or Swamp Pheasants	Centropodinæ
Cuckoo Shrikes	Campophagidæ
Cuckoos of all species	Cuculidæ
Diamond Birds (Pardalotes)	Dicæidæ
Dollar Birds (Rollers)	Eurystomus
Egrets of all species	Ardeiformes
Fantails	Muscicapidæ
Field Wrens	Timeliidæ
Flower-peckers	Dicæidæ
Fly-catchers (Wagtails)	Muscicapidæ
Fly-eaters	Muscicapidæ
Frogmouths	Podargidæ
Grebes	Podicipediæ
Herons	Ardeiformes
Honey-eaters (except Miners, Wattle Birds, Friar Birds)	Meliphagidæ
Ibises	Ardeiformes
Jabirus	Ardeiformes
Kingfishers (all species)	Alcedinidæ
Kites	Elanus
Land Curlews or Stone Plovers	Œdicnemidæ
Larks of all species	Motacillidæ Alaudidæ
Laughing Jackasses	Alcedinidæ
Lyre Birds	Menuridæ
Magpies	Gymnorhina
Magpie Larks	Grallina
Martins	Hirundinidæ
Nightjars or Goat-suckers	Caprimulgidæ
Nut-hatches or Tree-runners (Woodpeckers)	Sittidæ
Owls	Strigidæ
Parras	Parridæ, Glareolidæ
Parrots (Ground or Swamp)	Pezoporus
Pipits	Motacillidæ Alaudidæ
Pittas of all species	Pittidæ
Pratincoles	Parridæ, Glareolidæ
Regent Birds	Genus Sericulus (Ptilonorhynchidæ)
Rifle Birds	Paradiseidæ
Robins of all species	Muscicapidæ
Satin Birds	Genus Ptilonorhynchus (Ptilonorhynchidæ)
Shining Starlings (Calornis)	Eulabetidæ
Shrike Tits	Muscicapidæ
Song Larks	Timeliidæ
Spoonbills	Ardeiformes
Storks	Ardeiformes
Swallows	Hirundinidæ
Swamp Pheasants	Centropodinæ
Swifts	Cypselidæ
Thickheads (Whistlers)	Muscicapidæ
Thrushes of all species	Turdidæ, Prionopidæ
Tit Warblers (Tree Tits)	Sylviidæ
Tree-creepers	Climacteris
Tree-runners	Sittidæ
Warblers	Sylviidæ
White-eyes or Silver-eyes	Zosteropidæ
Wood Swallows	Artamidæ
Wren Warblers	Sylviidæ
Wrens of all species	Sylviidæ

BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

SCHEDULE B.

Common Name:	Technical Designation.
Bronzewing Pigeons	Columbæ
Brown Hawks	Falconidæ
Bustards or Plain Turkeys	Otididæ
Coots	Rallidæ
Cranes	Gruidæ
Crakes	Rallidæ
Curlews	Charadriidæ
Dottrels	Charadriidæ
Doves	Columbæ
Ducks, Wild, of all species	Anatidæ (excepting Black Swans)
Emus	Dromæidæ
Fig Birds	Oriolidæ
Finches (including Plum-headed, Banded, Painted, Zebra, and Redheaded Finches, &c.)	Ploceidæ
Geese, Wild	Anatidæ (excepting Black Swans)
Land Rails	Rallidæ
Mallee Fowls	Megapodiidæ
Moor Hens	Rallidæ
Native Companions	Gruidæ
Native Hens	Rallidæ
Orioles	Oriolidæ
Pigeons, all Wild	Columbæ
Plovers	Charadriidæ
Quails	Phasianidæ, Turnicidæ
Rails, Land and Water	Rallidæ
Scrub or Brush Turkeys	Megapodiidæ
Scrub Fowls	Megapodiidæ
Sea Birds, all	
Turkeys, Plain and Scrub or Brush	Otididæ and Megapodiidæ
Waders	Charadriidæ
Water Rails	Rallidæ

Close Seasons.

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, pay a fine of not less than one pound or more than five pounds.

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall pay a penalty not less than one pound or more than five pounds for every bird.

If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay a fine of not less than one pound or more than five pounds.

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

Situation of Reserve.	For Proclamation and Boundaries see *Government Gazette.*		
	Date.	Part.	Page.
Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area)	29 Aug., 1885	II.	769
Parish of Gracemere, county of Livingstone	29 Aug., 1885	II.	769
Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channel and the shores thereof)	12 Sept., 1885	II.	897
**Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny*	10 Oct., 1885	II.	1253
**Parish of Emu Creek, county of Cavendish ... ...*			
**Parish of Douglas, county of Aubigny ... .*			
Parish of Nerang, county of Ward, Southport	5 June, 1886	I.	1946
Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas))	13 July, 1889	II.	797
Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run)	14 Sep., 1889	III.	99
Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve)	20 Dec., 1890	III.	1403
Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve)	4 Mar., 1893	I.	670
Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park)	18 July, 1893	II.	583
Parish of Ossa, county of Carlisle, Seaforth	1 Jan., 1898	I.	21
Parishes of Cressbrook, Bowman, and Neara, county of Canning	11 June, 1898	I.	1596
Lake Clarendon	24 Mar., 1900	I.	961
England and Clarendon	25 June, 1900	I.	1650
Fitzroy, Nicholson, Faraday, Calioran	6 July, 1901	II.	564
Gavial and Gracemere (The Duck Pond)	13 July, 1901	II.	633
Horseshoe Lagoon, parish of Selkirk	16 Aug., 1902	II.	421
Cloyna	28 Dec., 1901	III.	990
Parishes of Antill and Jarvisfield	30 July, 1904	II.	249
Parish of Jarvisfield (Church Lagoon)			
Ditto (Red Lily Lagoon)			
Parish of Rockhampton (Murray's and Jardine's Lagoons)	27 Aug., 1904	II.	493
Parish of Charters Towers (Burdekin Weir)	29 Oct., 1904	II.	901
Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooke Islands	13 May, 1905	I.	1546
Parish of Yeerongpilly (Russell Wilkins)	16 Dec., 1905	II.	1273
Ditto (Water Reserve)			
Parish of Enoggera (Private lands on Toowong Creek)	11 Aug., 1906	II.	274
Parish of Yaamba (P. F. MacDonald's property) ..	8 Sep., 1906	II.	514
Parish of Noogoon (Mud Island)	8 Dec., 1906	II.	1195
Parish of Broadmere (Lake Murphy)	13 Feb., 1909	I.	341
County of Stanley (The Redcliffe Shire)	20 Mar., 1909	I.	738
Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses)	10 July, 1909	II.	70
Parish of Pentland (Pentland Dam and Swamp)	24 July, 1909	II.	220
Parish of Dugandan (A. J. McConnell's property) ...	4 Sep., 1909	II.	587
County of Nares (The Douglas Shire)	16 April, 1910	I.	1002
County of Elphinstone (Abattoir Reserve, Townsville)...	21 May, 1910	I.	1326
Parish of Taylor, Toowoomba District (Jubilee Park, Redwood Park, Picnic Point, and One-tree Hill)	8 Oct., 1910	II.	1010
Parish of Tingalpa (Shire of Wynnum)	18 Feb., 1911	I.	930
Gladstone Land Agent's District (Capricorn Group of Islands	5 Aug., 1911	II.	422
Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole)	23 Sep., 1911	II.	820
Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings)	29 June, 1912	I.	1711
Shire of Widgee	20 Dec., 1913	II.	1741
Parish of Stradbroke (Myora)	11 April, 1914	I.	1036
Shire of Maroochy	2 May, 1914	I.	1173
County Ward, area on coast from Southport to Pt. Danger	4 July, 1914	II.	38

* Note.—These reserves are for the protection of the following birds only: —Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, and Quails.

QUEENSLAND
and Territory of
PAPUA
1913
Scale 100 Statute Miles to an Inch
CORAL SEA
GULF OF
CARPENTARIA
PACIFIC OCEAN
Barrier Reef
No 2 DISTRICT
No 1 DISTRICT
NORTH
SOUTH
COOKTOWN
CAIRNS
PORT DOUGLAS
MAREEBA
HERBERTON
CARDWELL
TOWNSVILLE
CHARTERS TOWERS
NORMANTON
CROYDON
GILBERTON
KARUMBA
CLONCURRY
MALBON
CAMOOWEAL
BURKE
GREGORY
BOULIA
MITCHELL
ISISFORD
BLACKALL
TAMBO
LONGREACH
BARCALDINE
ARAMAC
HUTTABURRA
SPRINGSURE
CHARLEVILLE
AUGATHELLA
ROMA
WYANDRA
MARANOA
SURAT
DARLING DOWNS
TOOWOOMBA
BRISBANE
GLADSTONE
ROCKHAMPTON
MACKAY
BOLLON
CUNNAMULLA
THARGOMINDAH
ROCCUNDRA
CHARLEVILLE
EROMANGA
JUNDAH
BIRDSVILLE
QUILPIE
BEDOURIE
WELLESLEY ISLANDS
LAKE EYRE (NORTH)
LAKE EYRE (SOUTH)
AUSTRALIA
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
INDIAN OCEAN
TASMAN SEA

POTATO-DIGGING.

Mr. W. Dowie, of Trafalgar, Vic., claims to have put up a world's record by digging and bagging 60 bags of potatoes in eight hours (says an exchange). Thos. Malady, the holder of the previous record, has challenged him to engage in a potato digging match for £25 a side, and others are eager to compete. Malady's record was made in 1910, at Trafalgar, when he essayed to beat a Bungaree record of 48 bags in a day. The crop he was working on was the American Freeman, yielding about 12 tons to the acre, and the crops were thick. In nine hours he dug and bagged 60 bags.

[One would think that in a crop of 12 tons to the acre, it would have been advantageous to employ a potato-digging machine.—Ed. "Q.A.J."]

A NEW METHOD OF PREPARING SEEDS FOR MAILING.

The many unsuccessful attempts to import seeds of the mangosteen, in good condition for germinating, into Queensland and elsewhere, almost gave rise to the idea that it was impossible to introduce the fruit into this State. Still success was attained in a few cases after many failures, and this delicious fruit has been grown and has fruited at the Kamerunga State Nursery, near Cairns, also at Port Douglas, and we believe that one or two trees are to be found on the Lower Burdekin, near Ayr, but it is doubtful if the latter are of the true edible variety.

In the June issue of the "Philippine Review," the following important announcement was made by M. E. D. Merrill, botanist of the Bureau of Science, Manila. From this it would seem that the seed of the mangosteen can be so prepared as to be capable of standing a long journey, while retaining its full vitality: —

"Everybody conversant with the subject is well aware that the rapid loss of the viability of certain seeds of tropical fruits, such as the durian, the avocado, the mangosteen, marang, or the lanson, is due in a large measure to the invasion of fungi, and when these are excluded, provided that the seeds are otherwise properly packed in a medium of the right degree of moisture, there is really no sound reason why such seeds should not be successfully transported long distances, and retain their viability for a very considerable period.

"Mr. E. D. Merrill, botanist of the Bureau of Science, who has recently returned from a journey to Java and Singapore, related to the writer that he saw in the Singapore botanical garden mangosteen plants grown from seed that were shipped from Singapore to New York, United States of America, and from thence returned to Singapore, after which they were planted and gave a germination of 50 per cent. These seeds were washed in a weak solution of carbolic acid and then packed in moist charcoal that had been disinfected with carbolic acid. Over three months elapsed between the time of the disinfection and packing of the seed and the planting.

"The above experiment was carried out by Mr. I. H. Burkhill, director of the botanical garden in Singapore."

DISTRICT EXHIBITS AT THE WONDAI SHOW.

The accompanying illustration gives an excellent idea of the Mondure District Exhibit which took First Prize at the last Wondai Show. The exhibit was very favourably commented on by the judge, Mr. Butt, of Messrs. Denham Brothers.

PLATE 53.—WONDAI SHOW. MONDURE DISTRICT EXHIBIT WHICH OBTAINED THE FIRST PRIZE.

THE GREAT AUSTRALIAN ARTESIAN BASIN.

Although there are some artesian wells outside this area, yet, in speaking of the "Great Australian Artesian Basin," writes Mr. G. H. Knibbs, in the Official Year Book in the Commonwealth of Australia, the area is understood which includes (*a*) considerably more than one-half of Queensland, taking in practically all the State lying west of the Great Dividing Range, with the exception of an area in the north-west contiguous to the Northern Territory; (*b*) a considerable strip of New South Wales along its northern boundary and west of the Great Dividing Range; and (*c*) the north-eastern part of South Australia proper, together with the extreme south-eastern corner of the Northern Territory. The basin is said to be the largest yet discovered, and is about 569,000 square miles, of which 376,000 square miles are in Queensland, 110,000 square miles in South Australia, and 83,000 square miles in New South Wales. The area of the intake beds is estimated at 60,010 square miles—viz., 50,000 square miles in Queensland, and 10,010 square miles in New South Wales. It is estimated that at present there are about 1,760 bores tapping the basin in the three States. The deepest well was one known as Bimerah Run No. 3, Whitewood, lying between the Barcoo and Thomson Rivers; this had a depth of 5,045 ft., and was stated to yield 70,000 gallons daily. This flow is, of course, a comparatively small one, many wells yielding, when uncontrolled, from one to three million gallons a day. A well at Cunnamulla, Coongoola Bore, is stated to have a daily flow, when uncontrolled, of no less than 4,500,000 gallons.

The Queensland Artesian Bores on 30th June, 1911, totalled 1,133, and the daily flow amounted to 516,591,200 gallons. In 1913, the number of Artesian Bores in the State was 2,065, the total daily flow being 529,807,360 gallons.

Answers to Correspondents.

CATTLE DIP.

H. S. DOUGLAS, Harvest Home—

For 20 gallons of water dissolve ½ lb. of arsenic by the aid of ¼ lb. caustic soda. But the Agricultural Chemist recommends the purchase of ready-prepared concentrates, such as Queensland Cattle Dip or Royal Cattle Dip, as they are more effective than a pure solution of arsenic. We would suggest to our correspondent that, at any future time, he give us his address.

KAINIT.

C. SPEER, Hemmant—

Kainit is a crystallised mixture of potassium sulphate, magnesium sulphate, magnesium chloride, and water. It is a potassic manure only suitable for certain crops, and can be obtained from the Potash Syndicate, Sydney.

Manure for Pineapples and Strawberries.

The following fertiliser mixture may be used with advantage for Pineapples:—5 cwt. meatworks manure (blood and bones); 3 cwt. Thomas phosphate; 3 cwt. sulphate of potash; 1 cwt. dried blood or nitrate of lime per acre.

For Strawberries, a useful mixture is:—3 to 5 cwt. superphosphate; 1½ to 2 cwt. sulphate of potash; 1 to 1½ cwt. sulphate of ammonia or nitrolim per acre. Or, 1 cwt. fine bonemeal; 4 cwt. superphosphate; 2 cwt. sulphate of potash; 1½ cwt. nitrolim per acre.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1914.

Article.		JULY. Prices.
Bacon	lb.	8d. to 9½d.
Bran	ton	£5 17s. 6d.
Butter	cwt.	116s. to 120s.
Chaff, Mixed	ton	£6 to £6 10s.
Chaff, Oaten (Victorian)	„	£5 10s. to £5 15s.
Chaff, Lucerne	„	£6 5s. to £6 17s. 6d.
Chaff, Wheaten	„	£3 6s.
Cheese	lb.	8¼d. to 8½d.
Flour	ton	£9
Hams	lb.	1s. 2d.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	„	£3 10 to £4 15s.
Honey	lb.	2½d. to 2⅝d.
Maize	bush.	3s. 3½d. to 3s. 6d.
Oats	„	3s. 6d. to 3s. 8d.
Onions	ton	£8 10s.
Peanuts	lb.	2½d. to 3d.
Pollard	ton	£6.
Potatoes	„	£7 to £8 10s.
Potatoes (Sweet)	cwt.	2s. to 2s. 8d.
Pumpkins	ton	£1 to £1 5s.
Wheat, Milling	bush.	3s. 11d. to 4s. 1d.
Eggs	doz.	10d. to 1s. 1d.
Fowls	pair	3s. 6d. to 4s. 6d.
Geese	„	6s. 6d.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. 6d. to 6s.
Turkeys (Hens)	„	7s. 6d. to 8s. 6d.
Turkeys (Gobblers)	„	14s. 6d. to 17s.

SOUTHERN FRUIT MARKETS.

Article.	JULY. Prices.
Bananas (Queensland), sugar, per case	13s.
Bananas, G.M., per case	18s. 6d. to 19s.
Bananas (Fiji), per case	17s. to 18s.
Custard Apples, per case	6s. to 7s.
Lemons, per case	...
Mandarins (Queensland), per case	7s. to 9s.
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	7s. to 8s.
Papaw Apples, per quarter-case	
Passion Fruit, per half-case	5s. to 7s.
Pineapples (Queensland), (Queens), per case	8s. to 9s.
Pineapples (Ripleys), per case	7s. to 8s.
Pineapples (commons), per case	6s. to 7s.
Strawberries	...
Tomatoes, per quarter-case	3s. 6d. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY. Prices.
Apples, Eating (Tasmanian), per case	8s. to 9s.
Apples (Cooking), per case	5s. to 7s.
Bananas (Cavendish), per dozen	3d. to 4½d.
Bananas (Sugar), per dozen	1½d. to 2d.
Cape Gooseberries, per quarter-case	7s. to 10s.
Citrons, per cwt.	10s. 6d.
Cocoanuts, per sack	12s. to 14s.
Cumquats, per quarter-case	2s. 6d. to 3s. 3d.
Custard Apples, per quarter-case	3s. to 4s. 6d.
Lemons (Local), per case	4s. to 7s.
Mandarins, per case	5s. to 8s. 6d.
Oranges (Navel), per case	8s.
Oranges (other), per case	3s. 6d. to 6s. 9d.
Papaw Apples, per quarter-case	1s. 6d. to 3s. 6d.
Passion Fruit, per quarter-case	6s. 6d. to 7s. 6d.
Peanuts, per pound	2½d. to 3d.
Pineapples (Ripley), per dozen	2s. to 3s.
Pineapples (Rough), per dozen	6d. to 1s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 4s.
Rosellas, per sugar bag	3s. 6d. to 5s.
Strawberries, per dozen pint boxes	5s. to 10s.
Strawberries, per tray	2s. to 2s. 6d.
Tomatoes, per quarter-case	1s. to 3s.

TOP PRICES, ENOGGERA YARDS, JUNE, 1914.

Animal.	JUNE. Prices.
Bullocks	£11 5s. to £12 7s. 6d.
Cows	£7 17s. 6d. to £9 5s.
Merino Wethers	27s. 6d.
Crossbred Wethers	27s.
Merino Ewes	18s. 6d.
Crossbred Ewes	20s. 3d.
Lambs	21s.
Pigs (Porkers)	...

Farm and Garden Notes for September.

Field.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agave rigida*, var. Sisalana (sisal hemp plant), in rows 6 by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or too poor for any ordinary crops, should be planted with this valuable aloe. Especially should limestone country be selected for the purpose. If the soil is very poor, and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch or buffalo grass to grow about the roots. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sisal requires so little labour from planting to maturity that it can be grown to good profit despite the high cost of white labour. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass and paspalum, panicum, tobacco, pumpkins and melons. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

Kitchen Garden.—Now is the time when the kitchen garden will richly repair all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing, it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean

delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart, and 18 in. between the plants, and the climbing sorts, 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good look out for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. We can only repeat the advice we have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower, owing to the fact that it is usually a dry month, and that it is essential in all cases

to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly: don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruit-growers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables;" and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

VOL. II., PART 3. [SEPT., 1914.

Registered at the General Post Office for Transmission by Post as a Newspaper.]

THE QUEENSLAND AGRICULTURAL JOURNAL.

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

NEW SERIES.

VOL. II. PART 3.

SEPTEMBER.

By Authority:
BRISBANE: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER.
1914.

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